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Supplies from the Grid

THE allocation of a fair share of the economies due to the grid among the individual undertakings that contribute to those economies presents a problem of many aspects. One source of saving is the putting into profitable use of plant hitherto held in reserve, in return for which a standby is provided from the grid. A second source is the running of the most efficient plant at a higher load factor than that created by the local load. It is mainly in these two ways that the cost of constructing the grid must be met.

The question has been raised, however, as to how far the benefits due to the possession of efficient plant in individual cases should be handed over to consumers of other undertakings. The limiting factor on the one hand is set by the general grid tariff, which must cover within ten years all the expenses of the grid (including capital charges), and which must be low enough to make it worth the while of owners of non-selected stations to close them down. The other limit is the provision of the Act of 1926 that the cost of electricity to owners of selected stations shall not be more than it would have been without the grid.

The advantage to the owners of selected stations of choosing a tariff most suitable to themselves is less real than it might appear. In many cases the generating costs of non-selected stations are much above the grid tariff; consequently their gains from the grid are more substantial than those accruing to stations retained for operation, for which the best is represented by their own costs of production adjusted to the local load factor.

While this trend towards equalising the cost of production is no doubt an essential part of the national scheme, we believe that there is a sound general reason for recognising, as soon as may be practicable, the service rendered by the owners of selected stations in placing their efficient plant at the disposal of other undertakings, even if the service costs them nothing to perform.

The existence of a selected station denotes as a rule a plentiful supply of water, and hence the presence—actual or potential—of industries that can be completely electrified only if energy is available on more favourable terms than is strictly necessary elsewhere. Where such industries are set up in other areas they can be dealt with specially.

A small proportion of about 330 undertakings without selected stations have not found it profitable to take supplies from the grid, but the Act of last February introduced a much-needed measure of flexibility into the arrangements so that stations of economic value may be temporarily selected. Whether the attempt in the same Act to satisfy undertakings receiving bulk supplies indirectly, *via* the transmission systems of other authorities, will prove equally satisfactory seems doubtful.

As is stated in the seventh annual report of the Central Electricity Board (which we review on a later page), the net savings available are likely to be small for some time. We return to the basic consideration that in all cases their extent will depend upon the growth of load.

B.E.A.M.A. Pension Policy

A MATTER which only occupied three lines in our brief summary of the B.E.A.M.A. report last week should not be allowed to pass without editorial comment. For many years the Association has employed an expert staff to carry through one of the most important pieces of organisation work that British industry has to its credit. Under the Council and through innumerable sectional and other committees it has studied a host of ever-changing problems of the electrical and allied industries. Through many volumes of the ELECTRICAL REVIEW has run the story of efforts made to solve practically every problem that has arisen. About five years ago the Council began to consider ways and means for establishing a staff-pension and life-insurance scheme, but for some time the state of trade prevented all efforts coming to a successful issue. Last week, however, in

adopting the 1934 report, the membership acknowledged its liability and approved the scheme which is now in operation. By this action B.E.A.M.A. has given a lead to individual members of the industry, and it is to be hoped that many companies who have not already done so will now see their way to provide in some measure for officials and staff who have served them long and faithfully, giving them that relief of mind which comes with the knowledge that provision in some measure is made for their later years. The announcement is not without interest in connection with our recent articles on pensions and unemployment.

The National Gallery Lighting

THE daily period during which the National Gallery is open to the public was extended to 8 p.m. on the first three days of this week, and this programme will be maintained in future. A similar arrangement is to be made for the Tate Gallery by next winter. The lighting scheme, which has made it possible for a public that is busy all day to view in the evening what is probably the most representative art gallery in the world, is of interest to the illuminating engineer on many grounds. The adoption of simple methods that appear admirably to achieve their ends have resulted in a lower cost than would have been incurred by more elaborate schemes shown by experiment to be less successful. To the ordinary visitor the loss in colour effect due to the difference in the spectra of natural and artificial light will probably be negligible, while distinct improvements are noticeable in some ways. The observer, for instance, is not constantly worried by his own reflection in the glazing. Nowhere in Europe can pictures be viewed under such conditions. The installation provides not only an outstanding example of what can be done by scientific research in electric lighting, but also serves as a pointer to future achievements in this field.

Cheaper Lamps in June

VARIOUS inaccurate rumours will be set at rest by publication of E.L.M.A.'s official notice regarding certain lamp price alterations which its members will bring into force on June 1st. On that date 40-, 60- and 100-W pearl lamps in the 200/260-V range, known as type "B," and having a filament of the simple coil type, will be available at prices specified in our "Business Notes" pages to-day. This cheaper lamp is intended to meet the needs of those by whom low first cost is found to be more important than long life and actual lighting economy. It is not meant as a substitute for the coiled-coil lamp.

Distribution Authorities

IN the course of a very interesting story of the progress of the Midland Electric Corporation for Power Distribution, Mr. G. H. Nisbett covered many points which were crowded out from our abstract of his speech last week. One of these related to the various projects which have been advanced during recent months for the setting up of a distribution authority for the whole country under Parliament to merge the smaller existing distributing authorities, both company and municipal, in much larger units of management. He expressed the view, which has the support of many others directly interested in the industry, that Parliament would be wise to leave well alone, seeing that the growth now taking place in the use of electricity in this country is probably unequalled in any other country throughout the world. Mr. Nisbett not only seriously questioned the advisability of and the need for a distribution merger, but he said that the smaller authority, manned by a staff closely in touch with local requirements and characteristics and directed by those having a real and personal interest in the results attained, had an advantage over a large body, for big organisations are not necessarily more enterprising or more capable than small ones. However ambitious and well-thought-out may be the schemes produced by visionaries, there is a great deal to be said for this view regarding local knowledge and interest as a factor in the stimulation of local development. Unfortunately, some "black sheep" among the smaller undertakings have unconsciously fostered the disposition in others to design something big, but, be that as it may, no measure which obstructs the exercise of local enterprise is likely to be acceptable to the industry. The Minister of Transport stated at the E.D.A. luncheon that, generation having been organised, it rested with the industry itself to develop distribution. Anybody having a political or any other axe to grind is not needed.

Salesmen as Cooks

A CONTRIBUTOR to this issue expresses the opinion that the complete electric cooker salesman is one who is able to operate one of his cookers in a practical manner. There is no doubt that salesmen would avoid many ridiculous errors and correct others in their customers if they were versed somewhat in the culinary art. We can imagine, too, that such a man would be heartily welcomed by the jaded housewife who wanted a morning off if she felt that she could leave her cooking in competent hands. It has been said that men, as a rule, are the best cooks, and so there would be nothing unusual in a salesman who showed an aptitude for the business. There is nothing *infra dig.* about it either for there are some good precedents. Some of our readers will recall the frying of a piece of bacon by Professor Ayrton at the Royal Institution in the 'nineties, and a well-known M.I.E.E. often dons cap and apron and demonstrates the ease and efficacy of electric cooking to enraptured audiences of lady consumers.

System Instability

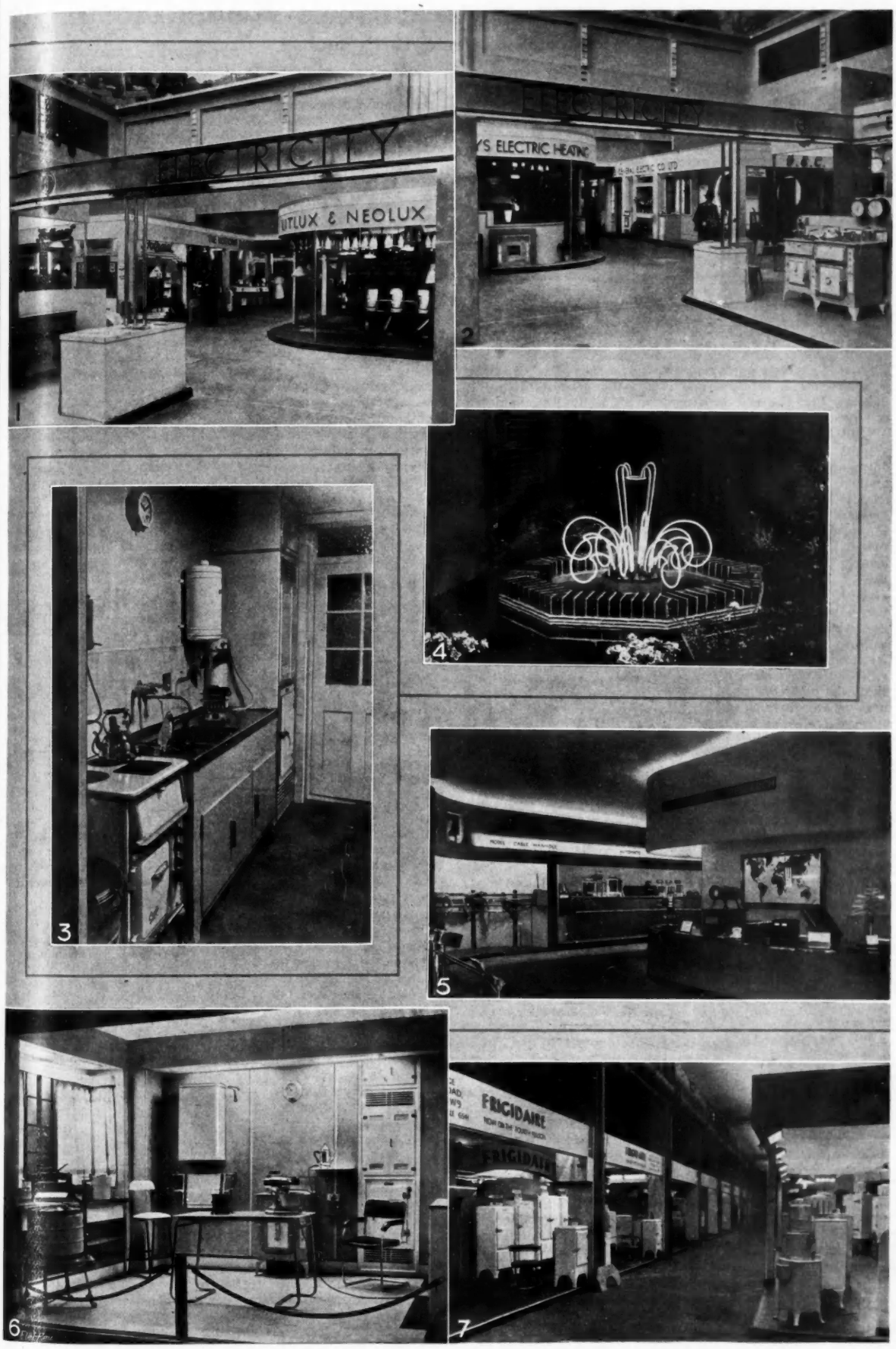
WE are not likely in this country to suffer much from inherent instability of our interconnecting systems with their relatively short runs of overhead lines. Such trouble as has been experienced on the 132-kV grid has been of a curious rather than a serious nature. While high speed of operation of protective apparatus and switchgear is essential, the main characteristic of stability is that the voltage should be maintained at a nearly constant value with normal load variations. Mr. W. D. Horsley in his I.E.E. paper emphasised the importance of automatic voltage regulation, especially in its influence on alternator stability. The subsequent discussion bore this out, but it would have been interesting to have heard more regarding the practicability of governing turbines more closely to assist the response of the alternator and its exciter.

Maintenance

IN suggesting to the London Branch of the Electrical Association for Women that it should educate those of its members who could afford the initial outlay to purchase, instead of hire, electrical apparatus, Mr. J. W. J. Townley did not mention one important aspect. The consumer who relies upon appliances provided by the undertaking expects its help at any time if they fail to function properly. The risk of breakdown may be small, but the fear of it is there, and until eliminated by experience it is likely to deter many from outright purchase. If a greater number of individual purchasers would bring down the prices of apparatus, in the interests of those who cannot afford the initial outlay, to the extent that Mr. Townley believes, it is surely in the interest of all undertakings to ensure the same prompt attention to maintenance for this type of consumer as for those who hire their appliances.

Tailpiece

A BEDFORD SQUARE contemporary in referring to the production of cheap and nasty apparatus, says:—"There are manufacturers in our own country who will try and beat the band by sailing as near to the wind of safety as ever they dare." Surely it would be better to take the wind out of the band's sails—that would nip it in the bud!



Electricity in the Ideal Home Exhibition. **(See page 485)**

1 and 2. The entrance to the Electrical Section which flanks the staircase to the gallery. 3. A corner of the kitchen in Messrs. Berg's house. 4. A neon tubing "fountain." 5. One of the Post Office exhibits. 6. The all-electric kitchen. 7. A view in the refrigeration section

Lift Control Gear. By A. Read

Protection against earth faults

ELECTRIC lifts can be considered as a definite part of the transport system of any large city. The number of passengers handled by lifts in New York is said to be almost as large as that conveyed by the elevated and underground railways.

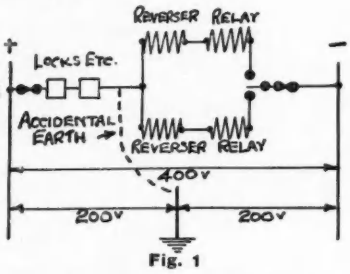


Fig. 1

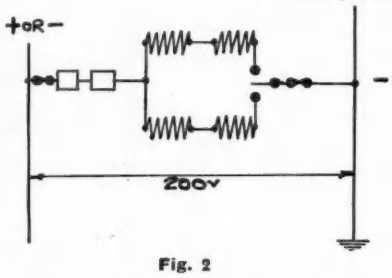


Fig. 2

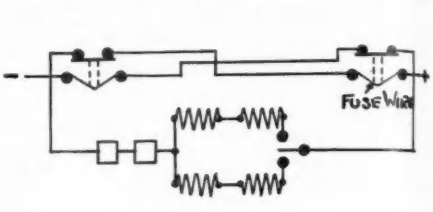


Fig. 3

The lift engineers' greatest problem is that of safeguarding passengers from accident, and it is a proud boast of the lift industry that the risk in a modern lift is far less than that of any other form of transport.

With the often complicated control systems in use at the present time, the greatest danger is from accidental breakdown to earth of some part of the circuit. The orthodox method of securing safety is to arrange that the supply of energy for feeding the control circuit is passed through a series of switches before the control gear proper is fed. These comprise electro-mechanical gate locks on landings, a safety switch on the lift-car gate, and an emergency-stop push button usually fitted in the car. Although the above system has been until recently used almost universally, a few minutes spent in studying the situation will show that where three-wire systems are in use the form of protection described leaves much to be desired. In order to render the accompanying diagrams as simple as possible, the circuits have been reduced to locks, reversing coils, one relay for each direction, and a simple change-over switch indicating alternative up or down direction.

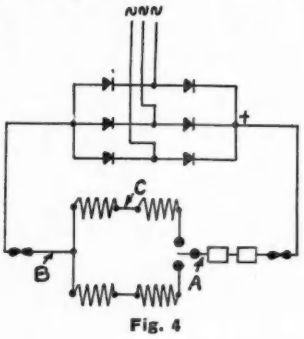


Fig. 4

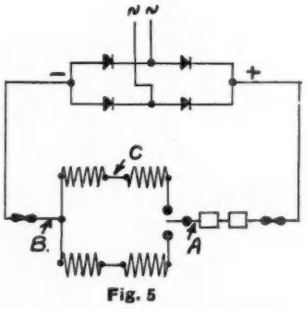


Fig. 5

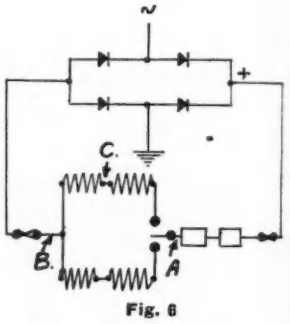


Fig. 6

Considering a d.c. installation first, there is, in the majority of cases, a power circuit at a pressure of 400 V across outers and a lighting circuit between either outer and earth of 200 V. In view of the large number of operations per day which a lift controller is called upon to perform, the operating coils must be very liberally rated in regard to both initial pull and temperature rise. Such coils when wound to pull in at 400 V will in some circumstances pull in at 200 V and will certainly maintain a contactor or solenoid in its closed position at the lower voltage after it has been closed by the higher.

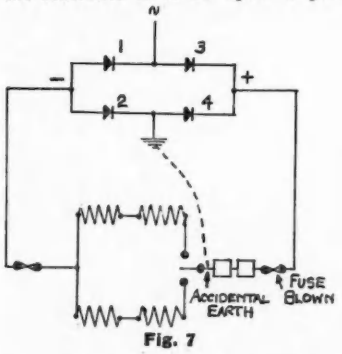


Fig. 7

Fig. 1 shows a typical circuit where the lift control is connected across outers. An accidental earth between locks and contactors will first blow a positive fuse, as a short circuit across the 200-V supply will be set up, and as soon as this side of the circuit is opened 200 V will be applied across the contactors and may cause them to operate. If the lift is in motion when the fault occurs the contactors will undoubtedly be maintained. In either case this supply will not be controlled by the locks and other safety switches, and therefore the lift is free to operate with gates open—a very dangerous state of affairs.

A simple solution to the problem is to operate the control circuit from the low-voltage neutral or third wire, and in many cases this is being done. In this way the only potential which may cause a breakdown is on the live side, and if the locks and safety switches are placed between the "live" main and the contactors, protection is complete (fig. 2).

It sometimes happens that the supply authority cannot, or will not, provide a low-voltage supply for control purposes. In the latter case it has usually been found that a letter of explanation is all that is required. Where, however, the low-voltage main is definitely not available, protection can be obtained by using a special type of fuse so constructed that the fuse wire which is connected in one side of the circuit supports a contact connected in the other side. If one of these circuit-breaker fuses is connected in each main the blowing of either fuse will cause the opposite side of the supply to be interrupted (fig. 3).

When an electric lift is operated from an a.c. supply, the above remarks hold good so long as the control gear is a.c. operated. Owing to the difficulty of maintaining quiet operation with a.c. contactors, it is almost general practice to use metal rectifiers for lift control. It might be thought that protection such as that described above would be equally effective with circuits using metal rectifiers, but careful consideration will show that this is not so.

There are three ways in which a metal rectifier may be connected, in order to provide d.c. for control purposes: (a) three-phase network, (b) single-phase, from outer to outer, (c) single-phase, from outer to neutral.

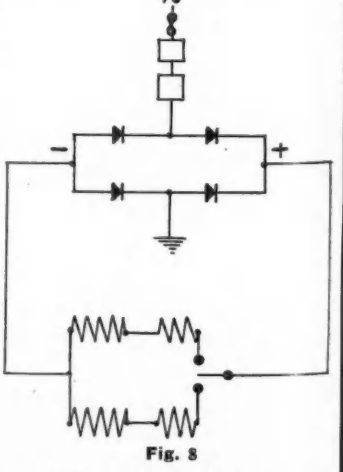


Fig. 8

Taking the systems in the above order, we have: (a) Three-phase network fig. 4. An earth occurring at A will blow the positive fuse and the control circuit will then be fed with half-wave impulses from the negative side of the rectifier. This feed will not be controlled by the locks but is unlikely to cause trouble owing to the low power value of the half-wave impulses.

An earth at B will blow the negative fuse with similar results; this will, however, be controlled by locks.

An earth at C will blow neither of the fuses as there is sufficient impedance on each side of the circuit to prevent it. The control will therefore be fed to earth on each half of the cycle. This feed will only be controlled by locks on one half cycle, and, it will be seen, it is possible for sufficient power

The Magnetic Field. By Prof. G. W. O. Howe, D.Sc., M.I.E.E.

The lines of force due to a rotating cylindrical bar magnet

IN the neighbourhood of a magnet certain phenomena can be observed which are ascribed to a magnetic field produced in space by the magnet. Although we know what happens to iron and steel, current-carrying conductors, bismuth spirals, &c., when placed in this magnetic field, we know nothing whatever of the nature of the field itself, and one may reasonably doubt whether it is anything more than a form of words signifying a space in which these phenomena are observable.

By means of magnet poles or exploring coils we can map out the magnetic field. We can draw lines in the direction of the force on a magnet pole, or in the direction normal to the plane of the exploring coil when the greatest e.m.f. is induced on reversing it. We can adopt a convention as to the number of such lines that we draw, so that their density is a measure of the magnitude of the phenomenon observed, but although nature is responsible for the forces which we observe and measure, we should never lose sight of the fact that the lines by which we indicate the direction and magnitude of these forces are of our own making or imagining.

A question which is sometimes asked is whether, when a cylindrical bar magnet is rotated about its axis, the lines of force rotate with it or not. Some people have made experiments with the object of finding nature's answer to this question, but always in vain, for nature replies that the lines are our convention and not hers, and that if we are uncertain as to their behaviour, it must be due to some lack of precision in defining our convention.

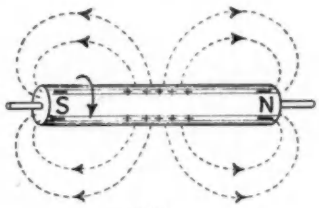


FIG.1.

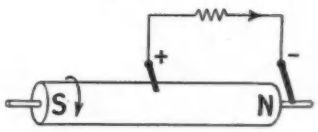


FIG 2

" Lines " Endowed with Existence

One is so used to referring to so many lines per sq. cm. that one is apt to lose sight of the conventionality of this graphical way of referring to the magnetic field and begin to endow the lines with a real individual existence. Some people feel that they must have a real existence because they know exactly how many there are, but this is a complete fallacy because instead of agreeing to draw or imagine twenty lines per sq. cm. to represent a magnetic field of twenty c.g.s. units, one might just as well agree to draw twenty million million per sq. cm. except for the inconvenience of writing.

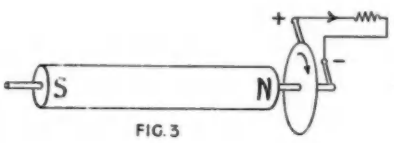


FIG.3

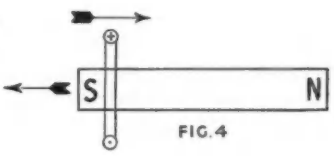


FIG.4

When a cylindrical bar magnet is rotated about its axis the magnetic field undergoes no change whatever either in magnitude or direction. What meaning can then be given to the question of its possible rotation? None, unless one " materialises " the imaginary lines of force. Unless one regards them as a number of material bristles which can be metaphorically chalk-marked and watched, no meaning can be given to the possibility of their rotation.

Clerk Maxwell assumed that when you had given the value of B at a point and the rate at which it was changing, you had completely specified the magnetic condition at that point in space, but an earnest believer in the " bristle " theory holds that, although the value B may be everywhere quite constant and its rate of change therefore zero, the field may be moving, whatever that may mean. Not only so, but although the field is everywhere unchanging it is supposed to induce e.m.f. in conductors due to their being cut by the lines taking part in this supposed movement. Such an assumption enables one to explain the observed facts, and cannot be disproved by experiment. The question is not one of fact but of reasonableness of explanation.

The description of any phenomenon depends upon the observer, and in discussing electromagnetic questions things are very much simplified if the observer can be so placed that the magnetic field appears to be unchanging. This is not always possible, but it is so in the present case, for to the ordinary onlooker, to whom the axis of the magnet is at rest, the magnetic field is everywhere unchanging ($dB/dt=0$), and the only electric forces induced are those due to the movement of electrons or conductors in this unchanging field.

In some cases an observer can be so placed that all the conductors appear to be at rest; the only electric forces then induced are due to the change of magnetic induction or flux density, *i.e.*, to dB/dt in the magnetic field. In many cases neither of these simplifications is possible and both causes of electric force have to be taken into account.

The space around and within the bar magnet is a magnetic field and when the magnet rotates on its axis it constitutes a conductor rotating in an unchanging magnetic field. Its rotation is not relative to anything else, not even to the observer, but is absolute, since different parts of the magnet are moving relatively to one another.

As the result of this movement of the conducting mass in the magnetic field, electric forces are induced within it which cause the electrons to migrate to some extent from one part to another, thus charging some parts positively and others negatively, until the electric forces in the steel due to these charges exactly counterbalance those due to the rotation in the magnetic field. The charges thus accumulated on the surface will set up an electric field in the surrounding space as shown in fig. 1. It is a primitive form of dynamo on open circuit, producing a potential difference but no current.

The " Bristles " Dilemma

A believer in the " bristle " theory would explain this differently; he would say that when the magnet is rotated it drags its lines of magnetic induction with it, and that they cut through space and induce in space the electric field, which then causes the charges on the magnet, and no experiment could prove that this explanation is any less correct than the more reasonable one. If the magnet is sawn through at the middle and the two halves rotated in opposite directions, the bristles must find it hard to decide what to do.

To put a load on the dynamo, one brush is placed at the middle and the other at the end as shown in fig. 2. Here

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Lift Control Gear (*Continued from preceding page*)

to be developed in the contactors to cause them to operate.

(b) Single-phase outer to outer. Fig. 5.

" Earth " faults at A, B and C will give results similar to those set out for the three-phase network.

(c) Single-phase from outer to neutral. Fig. 6.

As this circuit is similar to the one given as safe on d.c. supply, it is reasonable to assume that it will be equally effective on a.c. and at first sight this appears to be so. An earth at A will blow the positive fuse, and as the control circuit is then across earth and earth there will be no potential. An earth at B will blow the opposite fuse with similar results. An earth at C will not blow any fuses and the control circuit will only be fed with half-wave impulses, owing to the absence of potential between earth and earth, and the half-wave impulses will be controlled by the locks.

If this circuit is set up, however, it will be found that sufficient power is present in the coil to give something approaching full operation. The reason for this is shown in fig. 7. On one half cycle current flows from accidental earth through coil and rectifier limb No. 1 to live a.c. main. On the opposite half cycle no current can flow owing to the opposite polarity of rectifier limb No. 1, but the coil can discharge through a circuit containing rectifier limb No. 2 and the two earths. This feed and discharge sequence is well known and is purposely made use of in some applications of the metal rectifier.

Fortunately there is a simple solution to the difficulty, and examination of fig. 8 will show that if the safety locks, &c., are connected in the live a.c. main before it reaches the rectifier, an earth fault is rendered harmless.

there is no difference of opinion as to the current produced nor as to the constancy of B at every point, but one can choose whether to regard the e.m.f. as being induced in the only conductor which is moving in the field, *viz.*, in the rotating magnet, or in the stationary external circuit due to its being cut by the assumed movement of the materialised lines of magnetic induction.

It is difficult to imagine anyone deliberately choosing the latter point of view, but it is more difficult to imagine anyone thinking that he can decide between the two points of view by means of an experiment, and yet it has been tried. The same current is produced if the magnet is fixed and the external circuit is rotated at the same rate, and probably everyone would agree that the electric forces are due to the movement of the conductor through the magnetic field.

In the case of a copper disc mounted on a spindle opposite the end of the magnet, as in fig. 3, the current produced depends solely on the relative rotation of the disc and external circuit in the magnetic field and is entirely independent of whether the magnet is rotating or not.

In order to emphasise that two observers may give different but correct explanations of the same phenomenon, we may consider the magnet to be moved in the direction of its length while the coil (fig. 4) remains at rest. This is, at least, how it appears to an observer on the coil.

An observer on the magnet would, however, maintain that the magnet had not moved but that the coil had moved. The motion is relative and one statement is as correct as the other. How would these two observers explain the current produced in the coil? To the observer on the magnet there has been no change whatever in the magnetic field but the coil has moved and the e.m.f. is due to the conductor moving through the field in such a way as to cut the lines of magnetic induction. To the observer on the coil, however, the movement of the magnet causes the value of B everywhere to change and this is the cause of the e.m.f. induced in any stationary circuit.

The moving magnet itself offers a complicated problem to the observer on the coil, for it is a conducting mass situated in the electric field induced by the changing magnetic induction B and at the same time it is a moving conductor in a magnetic field; if he were to calculate the electric forces induced in the magnet, due to these two causes, he would find that they exactly neutralised each other. If, however, he were wise, he might see that the problem was greatly simplified by assuming himself to be on the magnet, for then he would assume the magnet to be at rest in an unchanging magnetic field, and therefore free of any induced e.m.f.

These examples will serve to show how little is experimental fact and how much hypothesis in our explanations of these fundamental problems of electromagnetic induction.

The Assessment of Undertakings. By R. W. Willis, M.I.E.E.*

A system which penalises efficiency

FROM one source or another we are continually being reminded of the enormous potential demand for cheap electricity. We are, however, aware of many factors which prevent the majority of electricity undertakings from giving a supply at a reasonable price, one of the most serious of which is the extremely heavy rate burden which electricity undertakings have to carry.

The "Statute of Elizabeth" (1601) is the foundation of the law of rating; it is not surprising that it contains little guidance as to the method by which the assessment of an undertaking should be arrived at. The Parochial Assessment Act of 1863 provides that no rate for the relief of the poor in England and Wales should be allowed by any justices or be of any force which should not be made upon an assessment of the net annual value of the several hereditaments rated thereunto; that is to say, of the rent at which the sum might reasonably be accepted, to let from year to year, free of all usual tenants' rates and taxes and tithe, computation rent charge, if any, and deducted therefrom, a probable average annual cost of repairs, insurance and other expenses, if any, necessary to maintain them in a state to command such rent.

No new principle was introduced by the Rating and Valuation Acts, 1925/28 in regard to the rating of electricity undertakings, which are definitely excluded from the de-rating clauses of the 1928 Act. The Rating Acts give little indication as to how the net annual value of an undertaking is to be ascertained, but as a result of numerous appeals to quarter sessions certain principles have been established.

The apportionment of the net annual (rateable) value between two or more rating authorities in whose areas the undertaking furnishes a supply of electrical energy is primarily a matter for the rating authorities to decide, but it should be remembered that an undertaking cannot be called upon to pay rates equal to a sum in excess of the net annual value of the undertaking as a whole.

It was expected that the 1925 Act would result in a more or less common basis for the assessment of electricity undertakings, but the returns of twelve undertakings of approximately the same size shows that assessments vary from 1.1. to 4.3 per cent, of the capital expenditure, and from 5.3 to 24.6 per cent. of the gross revenue.

Effect of Recent Revision

The majority of undertakings have now been reassessed, and in all cases the increase is a large amount. In my undertaking the assessment has been doubled, amounting to an increase in rates of nearly £1,500 a year. Had this not happened I should have been in a position to recommend my Council to make a reduction equivalent to ¼d. per kWh in the present flat-rate lighting charge.

The difficulty in the case of an electricity undertaking is the absence of any lettings according to the definition of gross value under the Act and to the monopoly attaching. The valuation divides itself into two parts, namely, the calculation of the total net rateable value of the whole undertaking, and the apportionment of this total figure among the various rating areas concerned. With regard to the total value the gross receipts are first taken and deductions are made for working expenses, the tenants' share and the cost of repairs, insurance and other expenses to maintain the hereditament in a state to command the rent or net annual value.

Calculating the Rateable Value

Apparently the methods adopted for calculating the net annual value are the profits basis or the receipts and expenditure basis, which is used to arrive at the rent which a hypothetical tenant would give from year to year for a tenancy commencing with the year in which the valuation becomes effective. As the law stands, the latest accounts prior to this date may be used and are usually adopted in practice, but not necessarily so. In the case of an undertaking which is developing, the assessor argues that a tenant may reasonably be expected to take into account the increased revenues which are likely to be made over and above the present revenues and, in fact, all that can affect the mind of the intending tenant should be taken into account.

The Central Valuation Committee recommends that regard should be had for the accounts of the last five available years preceding the date on which the valuation becomes effective. This does not mean a five years' average, but that the accounts for the last five years should be considered. In some cases an average of the last three years is adopted, but when an undertaking is developing the assessor will not consider an average. The most objectionable feature at the present time is the allowance made for "tenants' share" which appears to be a matter for the assessor's personal opinion.

For the year ended March 31st, 1932, no less than six million pounds was paid in rates by electricity undertakings in Great Britain. On a conservative basis this amount will, in all probability, be increased by over fifty per cent. for the present year and to this extent consumers would benefit if the money were not so applied. If the present method is allowed to continue, when the next quinquennial valuation is due to assessments will be again increased. Concerted and definite action should be taken at once.

Sooner or later the whole rating system will have to be remodelled. All we can say of the present rating system is that it works; but it is inequitable because rates are levied irrespective of ability to pay or of the amount of local services used. So far as public utility undertakings are concerned, and especially electricity supply, I feel that the present system is unjust, and if the method is continued the industry will be slowly strangled. The more efficient an undertaking the more it is penalised by the present method of assessment.

In a recent case an assessor pointed out that it is the practice all over the country to increase the valuation of a house where electricity is installed in preference to gas, the argument being that a house could be let more readily where electricity is installed. This is no doubt true, but it may not enable the landlord to obtain a higher rent.

* Electrical engineer and manager, Cheadle and Gatley.

British Manufacturers in China

By Prof. C. A. Middleton Smith, M.Sc., M.I.Mech.E.

EXASPERATED, a British engineer in Hong Kong recently told me that he would not give another order to a British engineering concern. He is a man who has placed five-figure orders (in sterling) for British machinery and electrical apparatus in South China. He fought for his country in the war and would be among the first to maintain, on any political problem concerning international affairs, the attitude of "my country right or wrong." The reason is that he has had so much annoyance and loss due to his insistence in the past that only British equipment should be used on the work under his supervision.

If this were an isolated complaint we might ignore it, but it is not. Many similar criticisms are made in this part of the world, and there is evidence of real cause. This is discouraging to those of us who are anxious about the prospects of British trade interests in China.

Desire to Help

The best years of my life have been given to training Chinese students in British engineering standards and in losing no opportunity of furthering the trade interests of the British engineering industry. Except for sentiment, it makes no difference to me whether British machinery or that made in other countries is used in China, but sentiment is a weighty factor in this part of the world. It is, therefore, always something of a shock to hear definite allegations of the commercial inefficiency of British manufacturers, who must depend upon their export trade for prosperity. Let me add that there seems to be very little criticism of the products. The technical work is generally believed to be excellent.

In the Far East the old trade with Britain in cotton goods has greatly diminished in recent years, and it must inevitably disappear. Formerly, exports in "piece goods" comprised the bulk of the cargo carried, but now the item "machinery" exceeds it. For the first six months of 1934 the ratio of the value of imports from Great Britain to China of machinery, cotton piece-goods, and iron and steel was 490 : 348 : 305, and the value of cotton goods is a rapidly diminishing figure.

During the industrial development of Japan many British engineering firms profited. Even in these days some still obtain useful orders. The members of the British trade mission to Manchukuo appear to have been impressed by the opportunities in that vast territory for British engineering exports. It is as well to remember that Manchukuo has a large majority of Chinese in the population of the country, and they are the people who are developing the natural resources of the territory. Nevertheless, the natural resources of China are vastly greater than those of Manchukuo, and China has commenced its industrial development.

In Canton large sums of money have been spent in recent years on imported engineering equipment. Many of us, who are convinced of the need to increase engineering exports in the general interest of our own country, have done our best, as volunteers, to help in the work.

It is in consequence of the continuance of annoying episodes such as the British engineer referred to that I am writing this article to explain to the industry generally some of the difficulties that British engineers are experiencing in China. It is, of course, impossible to mention the names of companies concerned, but the information will, I think, be of value to those manufacturers who wish to increase their export trade.

Delay and Carelessness

The two faults most commonly mentioned are delay in deliveries and carelessness in packing. Refusal to listen to advice from those who understand the Chinese and who have had long experience in China also accounts for dissatisfied customers. In some quarters British manufacturers are criticised for their lack of enterprise concerning a little expenditure and the difficulties of local agents regarding finance, but it is impossible for one without experience in commerce to express an opinion as to the justice of such complaints. Undoubtedly, the difficulties which British engineers in China experience in obtaining orders seem to be more often concerned with finance than technology.

With regard to delivery, there have been many cases brought to my notice in which goods have been promised for a definite date and a great deal of inconvenience has been caused by the fact that the promises have not been kept. Recently a consignment of cable was ordered from England. The cable was to be buried in the floor of a power station, and the architects planned the work on the assumption that the promised date of delivery would be kept. The floor was made of a special compound, and its construction required that workmen should be brought from Shanghai. The men and the materials for the floor covering arrived in good time, but the men were kept waiting in Hong Kong for five weeks before the cable arrived. The cable was all of stock sizes; it takes six weeks to carry cargo from England to Hong Kong, and as we allowed twelve weeks from the date of placing the order we considered we had allowed ample time. Actually, delivery took place after seventeen weeks.

Prof. Middleton Smith is Taikoo Professor of Engineering in Hong Kong University, and his experience of conditions in the Far East covers a period of more than twenty years

On an important construction job in South China, involving the most careful planning of time and labour, the same sort of delay took place in connection with the delivery of certain stock equipment. The British engineer whom I have already mentioned asserted that in desperation he has since placed useful orders with the agents of American manufacturers, and he added that he had never been let down, either in the date of delivery or in the packing of the goods.

"Good Enough for China"

He suggested that British manufacturers regard China as such a backward country that they need not worry much about orders from this part of the world. That, of course, is a great mistake. The Chinese have an entirely different outlook on industrialisation from that of even two decades ago, and they are eager to use machinery.

There is no man in the world more intent upon getting good value for his money than a Chinese. It is astonishing to the European how much trouble a wealthy Chinese will take to save even a few pence. The great obstacle, at present, to an immense import trade in machinery is finance. The difficulty is to find the money in China with which to pay for the machinery.

Let us now turn to the difficulties caused by packers and others. Some years ago we were supplied with an internal-combustion engine. A certified test sheet giving results of the usual trials at full load, &c., was sent to us. When we came to erect the engine the half-time shaft was such a misfit that it took us some days to turn it down in the workshop.

On another occasion, a few months ago, after considerable delay in delivery of machinery, we found certain essential parts missing, and after more waiting the makers replied that they regretted the omission, which was due to an oversight. A further machine, ordered from Britain, said to be always in stock, arrived much later than we expected. One part was broken, apparently due to bad packing, and another part (a spring) was missing.

Payment for Goods

Agents for British companies in China repeatedly complain that they are handicapped in securing orders because manufacturers will not co-operate with them in the matter of payment for goods in instalments. Naturally, the manufacturer wishes to be made sure that ultimately he will be paid. The story of the Chinese railways, in recent years, is not encouraging to those considering credit, nor have the political changes in China given great confidence to those who deal with certain Provincial Governments.

During the first half of 1934, among countries trading with China the United States ranked first, handling one-quarter of China's total foreign trade. For the corresponding period of the previous year the American share was 19.85 per cent. The share of Japan was 12.24 per cent., as compared with 10.91 per cent. in the corresponding period last year. Great Britain came third with 9.77 per cent., slightly higher than the last figure (9.65 per cent.). Coming next in importance were Hong Kong, Germany, India, Dutch East Indies, French Indo-China, France, and Siam. The British figures are complicated by the fact that many imports from that country are unloaded in Hong Kong and re-exported. This applies to imports from other countries to a lesser degree.

In spite of the difficulties which retard engineering development in China, progress is being made, and it is to be hoped that British manufacturers will obtain a good share of the trade, as they can do if they display enough enterprise.

Lighting the National Gallery

A Successful Installation

THE scheme for lighting the National Gallery that was inaugurated on Monday last is the result of a recommendation in the final report of the Royal Commission on National Museums and Galleries in 1929, and owes much to the interest taken in it by the Rt. Hon. W. Ormsby-Gore, First Commissioner of Works. In co-operation with the trustees and the director, Mr. K. M. Clark, and the Department of Scientific and Industrial Research, the engineering staff of the Office of Works carried out extensive investigations and eventually adopted a system based on a scheme submitted by the General Electric Co., Ltd.

The main feature is that a high-intensity even illumination is cast on to the walls, while the arches are left relatively dim. The eye is thus drawn naturally to the pictures and glare is avoided, the general lighting being supplied by reflection. The absence of light on the upper parts of the wall prevents reflection in opposite picture surfaces and the intensity on the floor is too low to create a reflection of the observer in the glazing.

A general view of the new lighting in the National Gallery, and (right) three pictures in Room XXVI, showing the excellent results obtained

Narrow masks are fitted into the lanterns to prevent the light shining into the eyes of those entering the rooms. Additional light of a different colour value has been introduced to give the best light in some cases, *e.g.*, on some of the famous pictures in the large Venetian Room. The most conspicuous success is obtained in Room XXV (British School).

The total number of fittings installed, including those on the stairs and in the vestibule, is sixty-four, with a total lighting load to 90 kW. In most instances 1,500-W "Osram" lamps have been installed, but other sizes from 250 to 1,000 W are also in use. The lighting units (except in the Duveen Room, which owing to its shape receives non-standard treatment) are suspended from the central axis of each gallery. The lantern employed is in the form of an inverted pyramid carrying a single frosted lamp and one or more mirror reflectors of special contour designed to direct the light in such a way as to secure even intensity of illumination over the portion of the wall on which the pictures are hung.

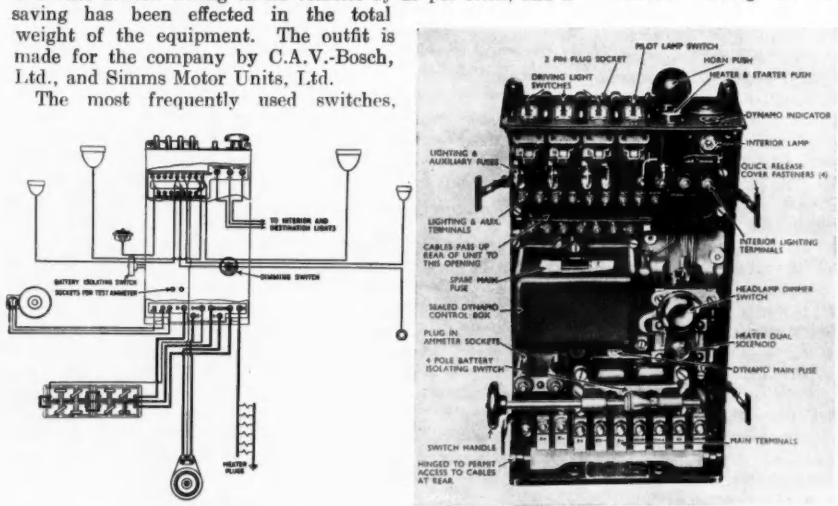
Metal louvres screen the light source on the sides facing the walls; the contiguous sides of adjacent lanterns are closed, as the light from this direction was found to be of little value at the pictures owing to the glancing angle of incidence resulting in the production of multiple frame shadows. The height of the fittings above ground prevents their reflection becoming visible in the glazing at viewing distances.

A standby battery has been installed to provide emergency lighting. The total cost of the installation, including that of three years of research, was £5,500. It is hoped to illuminate the Tate Gallery for evening opening by next winter at a cost of £4,000.

Simplifying Omnibus Wiring

BY adopting a new unit which concentrates the electrical control equipment within a single casing in the driver's cab the Associated Equipment Co., Ltd., has found it possible to reduce chassis wiring on its vehicles by 25 per cent., and a saving has been effected in the total weight of the equipment. The outfit is made for the company by C.A.V.-Bosch, Ltd., and Simms Motor Units, Ltd.

The most frequently used switches, which are of a new, robust, and waterproof pattern, are grouped on the top panel. This panel also contains a heavy-type starter and heater pushes, a dynamo-charging indicator, a 2-pin plug for a portable inspection lamp, and a rubber-covered horn push in such a position that it can be easily depressed by the driver's elbow. Projecting through the front panel is a headlamp dipping switch which is conveniently placed to enable it to be operated by the driver of the vehicle without taking his attention from the road.



Left: Circuit wiring diagram. Right: The control unit

Fuses and lighting terminals are mounted inside the unit immediately beneath the appropriate switches, and interconnections are made by riveted copper strips, while lighting wires from the chassis are conducted from the bottom of the box through an insulated duct in the back panel to the terminal board. The unit is hinged at the bottom so that simple removal of two top bolts allows it to swing forward, thus exposing all the rear connections.

There is a four-pole battery master switch to carry the full starter current. When operated by means of an exterior handle this completely isolates all electrical equipment from the battery. In the case of the heater solenoid one double-pole unit replaces the two single-pole units previously used, and to minimise voltage drop it is connected by solid copper strips to the battery switch.

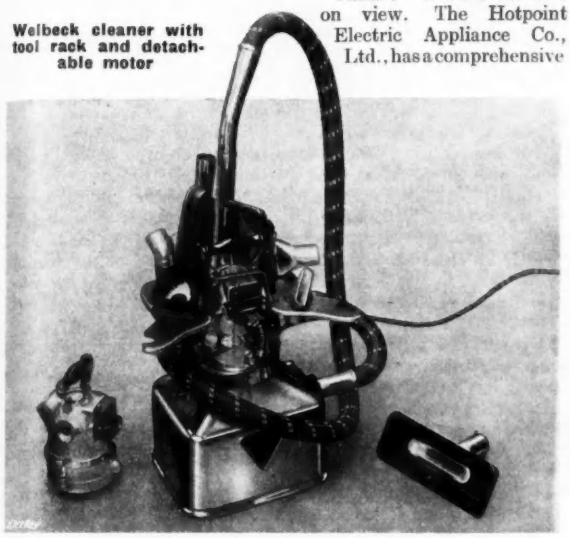
A voltage regulator and dynamo cut-out is contained in a sealed cover, and in the event of failure this can readily be detached, while for the purpose of checking dynamo output an ammeter shunt is permanently in circuit as a part of the equipment.

Electricity and the Ideal Home

Excellent displays at Olympia

AS we said last week, this year's Ideal Home Exhibition is probably more electrical than most of its predecessors. In the electrical section of the show an assortment of appliances of different makes is to be seen on the stands of the British Electrical Development Association, including the "Eco-Dry" clothes airing cabinet (Economic Dryer Co., Ltd.). The upper portion contains pull-out racks on which to hang garments. Lower down there is a draw-out wire tray and the heating element is in the base of the welded sheet-steel cabinet.

Messrs. Bertram Thomas show electrically heated plate and dish warmers and a series of large hotplates, carving tables, trolleys, and cupboards with glazed doors and sides for keeping food hot electrically in the dining room. Tubular "Tunnel" heaters are also on view. The Hotpoint Electric Appliance Co., Ltd., has a comprehensive display of water heaters; cookers with "Torribar" radiant boiling plates; washing, wringing, and ironing machines; vacuum cleaners, fires, irons, kettles, toasters and "Bandolero" fans.



Welbeck cleaner with tool rack and detachable motor

The centre portion of the stand of the General Electric Co., Ltd., is a lecture theatre in which cookery demonstrations are given daily. The latest cookers have an improved finish outlined in colours and a simmering control which, in effect, provides a fourth heat. The price of the washing machine has been reduced materially, and a pedestal ironer has been introduced which enables ironing to be done in a sitting position. A knee control lever under the frame leaves the operator's hands free and the machine can be used for pressing clothes. New chromium finished reflector fires at modest prices are worthy of attention, as are also distinctive panel and wall-plaque inset fires. The patented construction affords a wide choice of decorative materials for the surround. The latest hair dryer in a black anodised aluminium casing has an exceptionally large diameter diffusing heat outlet, 900 W loading, and a three-heat switch.

Lamps and Fittings

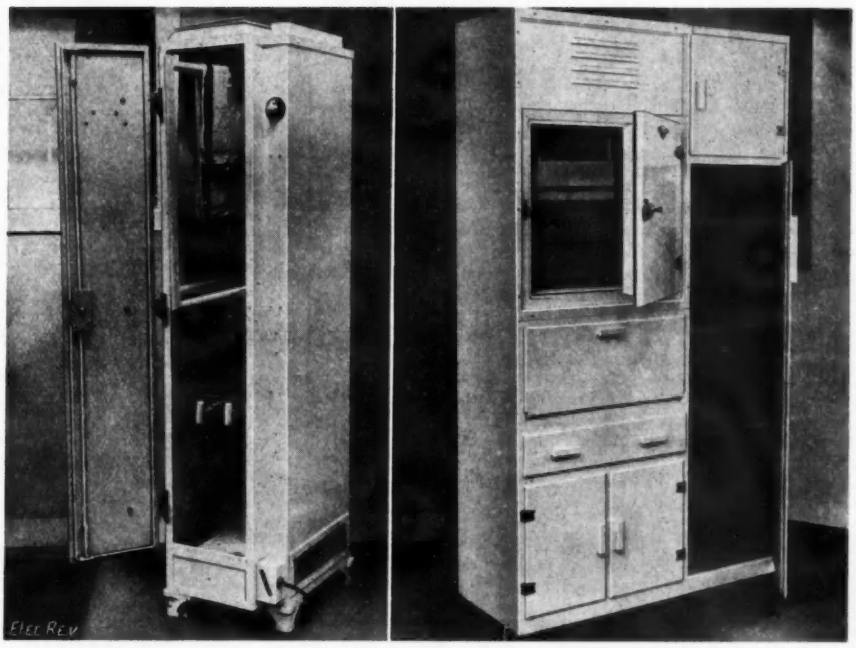
Unusually modest prices characterise the lighting fittings of the G.E.C., which are mainly domestic types exhibited for the first time with neat forms of glassware in delicate tints with silver or silver and red line decoration, and chromium-plated metalwork. "Roanoid" ceiling fittings and wall brackets specially designed for bathrooms, kitchens, &c., are available in a wide variety of shades. The whole of the lighting of the stand is carried out by "Osram" architectural lamps.

The Harbridge Crystal Glass Co. has some table lamps of original and graceful shapes. James Powell & Sons (Whitefriars), Ltd., display distinctive table vases and bowls of handmade glass in delicate colours. Two designs by Barnaby Powell are a sea green globe wound with blue glass ribbon and filled with water, while a white cloudy lamp has a double fitting, the lamp in the base producing stronger diffused light than the lamp under the shade, which is more decorative in nature. Many attractive designs are also shown by the Artistic Venetian Glass Co., Ltd., Messrs. Phillips & MacConnal, Ltd., Louis Dernier & Hamlyn, Ltd., and Hailwood & Ackroyd, Ltd.

G.E.C. cooker, with simmering control, finished in coloured enamels

Harcourts, Ltd., demontrate glassware tinted in "Neutratone" blended colours to harmonise with most decorative schemes. A range of pendants of varied designs have popular appeal, while fittings are specially designed for use with the single-sided opal tubular lamp. The "Kilgetty" pendant is a typical example of British moulded glass with supporting metalwork.

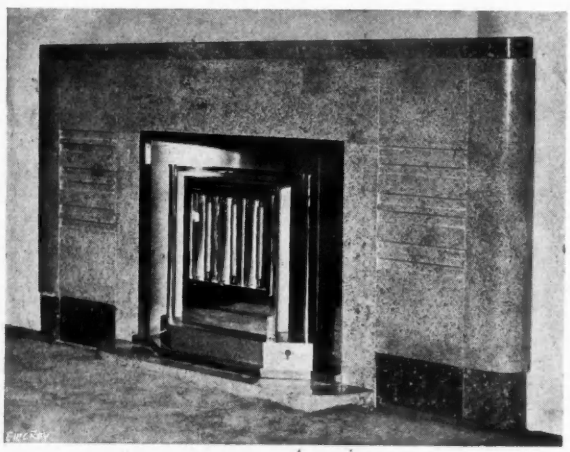
The Aldwych Lamp Co., Ltd., has a double-filament lamp of otherwise normal type with a simple change-over switch in the cap for bringing the second filament into use when the first one fails. "Mazda" lamps have attained to their silver jubilee, that trade name having been first adopted by the British Thomson-Houston Co., Ltd., early in 1910. More recently "light tubes" have become available in a range of lengths, shapes and colours, with sprayed and tinted opal glass. In order to demonstrate the wide applicability of these



Left: "Eco-Dry" electric clothes drying and airing cabinet. Right: "Coldair" combined refrigerator and kitchen cabinet

lamps they have been employed in geometrical patterns to light the company's stand. A "safety-first" hand lamp transformer reduces the mains voltage to the safe value of 12 V. The company also shows a range of "Mazda-Mercra" street-lighting and floodlighting equipment of the types shortly to be employed for illuminating a number of important buildings during the Jubilee celebrations.

The B.T.H. sunlamp for ultra-violet ray treatment at home is exhibited. Hanovia, Ltd., make solarium lamps for indoor sunbathing, the latest "Homesun" models being self-starting on the discharge lamp principle. Pentesales, Ltd., market the "Neron-Vitalux" blue-bulb ultra-violet lamp with reflector



The "Haloberry" suite

stand. Ideal Home Electrical Appliances, Ltd., have a range of violet-ray "vitalators." Fortiphone, Ltd., and Mr. R. H. Dent show aids to hearing for deaf people.

Fires and Air-conditioning

Besides "Magicoal" fires, Berry's Electric Ltd., displays processed slate and marble surrounds with inset radiators. A prominent exhibit is the "Haloberry" suite, similar to one which has been installed in the King's House. This incorporates a "halo" surround effect obtained by coloured light. The rectangular element panel has a curved rear screen behind which is a fan that circulates hot or cold air into the room.

Messrs. Cakebread, Robey & Co., Ltd., make faience and tiled fireplaces with inset electric clocks and electric radiators for occasional use. Messrs. A. Bell & Co., Ltd., have several designs combining coal and electric fires with clocks, as well as tiled radiators, electric wall panels, and inset fires. Other concerns exhibiting similar fireplaces are Messrs. Candy & Co., Ltd., and W. N. Froy & Sons, Ltd.

Messrs. Bratt Colbran, Ltd., have a selection of radiators of distinctive design, and special attention is directed to an electric screen fire. On the stand of the Interoven Stove Co., Ltd., are portable "Latona" water-vapour radiators with an immersion heater in the base. "Thermidair" convectors for central heating and air conditioning can be operated electrically under automatic control. Frigidaire, Ltd., demonstrates air-conditioning plant incorporating motor-driven fans by means of which the temperature and humidity of the atmosphere can be controlled.

Cleaners and Floor Polishers

Among the cleaning machines which are on view is that of the Welbeck Co., which is now made by the B.T.H. and associated companies. It has a rectangular metal canister and a patented tool rack is attached to the machine itself. A double action carpet nozzle is provided and the motor is detachable so that it can be used for a variety of other purposes.

The external dust bag cleaner of the Edison Swan Electric Co., Ltd., is equipped with all necessary attachments, including a floor polisher. The "Goblin" range of the British Vacuum Cleaner & Engineering Co., Ltd., includes an external dust bag model with a handle which can be shortened for single-handed use, while among the cylindrical types is a lightweight without wheels or runners which is used upright like a broom. The outfit sold by Newmode Electric Appliances, Ltd., is also manufactured by the B.T.H. Co. There is no dust bag to empty, while a floor polisher and dry scrubber are incorporated, and it can be used as a blower.

British Electric Domestic Appliances, Ltd., show the "Mary Ann" cylindrical model and the more powerful "Bedalux" for larger homes. The "Airflo" machine of Vactric, Ltd., incorporates beating and sweeping actions. It has a motor-driven brush, a headlight for dark corners, an easy-steering handle and an adjustment for carpet thickness. Other models include the cylindrical "Silent Q," while the "Vactric" floor polisher has interchangeable brushes and can be employed for waxing floors.

The larger Hoover models have a headlight. Model 800 has two-speed control for light- and heavy-weight carpets and the "Dustette" is a small machine for single-handed use. Special features provided by Electrolux, Ltd., include an indicator which shows when the dust bag needs emptying and attachments for shampooing carpets and spraying purposes. There is also a machine for dry polishing lino and hard-wood floors.

A canister machine is demonstrated by Tellus Super Vacuum Cleaner, Ltd. It has a light steel container and the motor is detachable for spraying purposes. It can also be employed as a blower for operating the "Tellus" clothes-washing machine.

Extensive Refrigerator Display

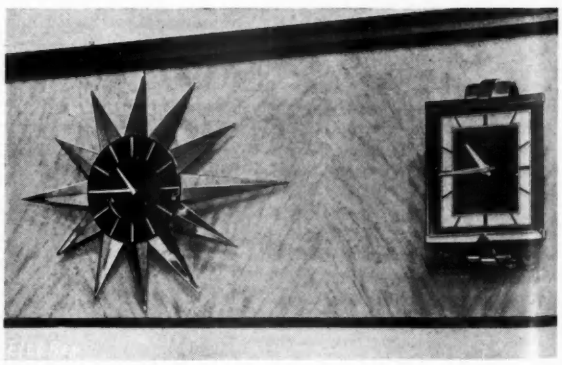
Apart from the "Liftop" chest the International Refrigerator Co., Ltd., shows cabinets with completely hermetically sealed B.T.H. mechanisms, samples of which are being subjected to water and dirt tests on the stand.

H.M.V. Household Appliances, Ltd., make special provision for cooling sweets and producing ice cream. Frigidaire, Ltd., has a range from the 2 cu. ft. "Koldchest" to 12 cu. ft. cabinets for larger households, embodying a hydrator, quick release ice trays, and a seamless porcelain interior.

Electrolux, Ltd., offer cabinets with storage capacities of from one to 45 cu. ft. and green or white exterior finishes. The latest models are air cooled and there are no moving parts. To the range of Kelvinator, Ltd., there has recently been added the "Kelvinette" for the small house. The Pressed Steel Co. (of Great Britain), Ltd., has a domestic range of seven sizes of from 2.5 to 11 cu. ft. storage capacity. Foot-pedal operated doors can be fitted and one model combines a small refrigerator with an electric cooker.

Coldair, Ltd., now provides standard exterior finishes in blue, primrose, green and white, with capacities from 3 to 12 cu. ft. Refrigerators are also built into a kitchen cabinet, a table-top vegetable bin, or stainless-steel sink. Marco Refrigerators, Ltd., make four household cabinets, while the "Aerofrige" sold by British Electric Domestic Appliances, Ltd., has a storage capacity of 5 cu. ft.

The refrigerators of Ismay Zeros, Ltd., have no moving parts and are air cooled; they are actuated by a heater element which is switched on and off by a Venner time switch. Leda Electric, Ltd., standard cabinets range from the 2 cu. ft. "Minor" to an 11 cu. ft. table model, besides portable all-steel combined ice-cream freezers and storage cabinets. The Lightfoot Refrigeration Co., Ltd., shows "Westinghouse"



Two examples of "Tymo" clocks with large movements

cabinets of from 2.25 to 40 cu. ft. storage capacity, including a small chest with a lid in place of a door. The mechanism is hermetically sealed and a rotating interior shelf is fitted.

Miscellaneous Products

Tyme, Ltd., display clocks to match existing interior decorations. Modern materials and designs of unusual but attractive shapes and patterns are available with extra large Garrard movements for synchronous a.c. models. The Bulle Co., Ltd., has a large selection of timepieces operated by self-contained dry batteries.

British National Electrics, Ltd., have a range of cookers, fires, irons, vacuum cleaners, washing machines, water and room heaters, floor and table lamps, clocks, &c. Messrs. Bulpitt & Sons, Ltd., exhibit flat-bottomed cooking utensils, combined kettles and saucepans, coffee percolators, porringers, urns, fires and screen fires. Messrs. Corfield-Sigg, Ltd., also make a range of aluminium ware flat-bottomed utensils for hot-plate cooking. Messrs. S. Guiterman & Co., Ltd., show a handy "Mixmaster" mixing machine and a small electric freezer.

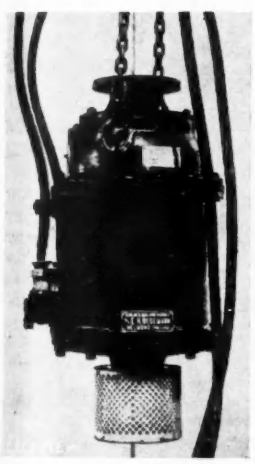
Under-water Motors

An efficient method of driving pumps

So far as we are aware, only one manufacturer specialises in the production of electric motors that operate totally submerged in water. Such motors are especially suitable for driving pumps that are normally immersed, as they function at maximum efficiency when flooded, the windings of the motor being cooled by the flow of water through the machine.

This development was evolved from an early McDonald patent in 1911 by Mr. T. L. Reed Cooper, whose improvements and variations form the subjects of six British patents and three others in a provisional stage; also four German, two French, two Belgian, one Australian, one South African, one Dutch, and two American patents. The machines are of British design and are made at Southall, Middlesex. About 4,000 of them have been sold to naval, marine and salvage authorities, colliery and mine owners, water companies and borehole users, the Brimsdown, Willesden, Stepney and Battersea power stations, electrical manufacturers and general contractors.

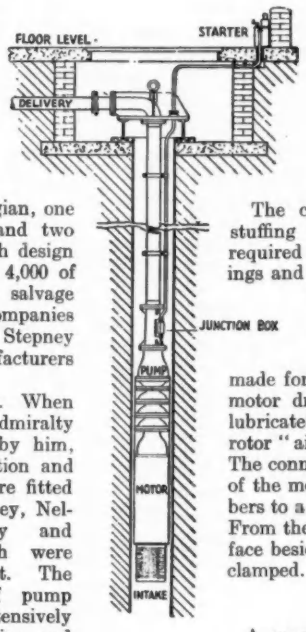
Submersible Motors, Ltd., was formed in 1912. When Mr. Cooper left the company the British Admiralty decided that its orders should be supervised by him, and electric pumps according to his specification and later patents were fitted in H.M.S. Rodney, Nelson, Medway and Resource, which were then being built. The earlier type of pump was installed extensively in British warships, and is used also by five other navies. Nearly ninety were employed in raising the German fleet at Scapa Flow, while one is said to have prevented H.M.S. Lion from sinking after it had been damaged in battle.



A motor pump made in Holland under licence

For driving the pumps in dockyard service and salvage operations the inventor designed a special hose- and weather-proof portable oil-engine alternator set. At the conclusion of the war he patented an improved design of hollow rotor motor pump, and registered his motor and pump under the trade mark of "Electromersible." He then concluded a royalty arrangement with the British Admiralty whereby the patent electric pumps of reduced weight and size were built by public tender for use in warships.

About three years ago Electromersible Motors & Pumps, Ltd., was formed (incorporating the original "Submersible Motors" company), and amended designs were produced of a narrow-diameter motor for direct coupling to an elongated pump submerged at the bottom of tube wells. The combined motor and pump set is passed down the borehole, and hangs from the end of the delivery pipe to which is clamped the cable that conveys the electricity for driving the motor at depths of from 100 to 500 ft. In this way there is no need for a long driving shaft, with its attendant wear and tear owing to the difficulty of maintaining alignment by reason of the impossibility of drilling small boreholes absolutely vertical.

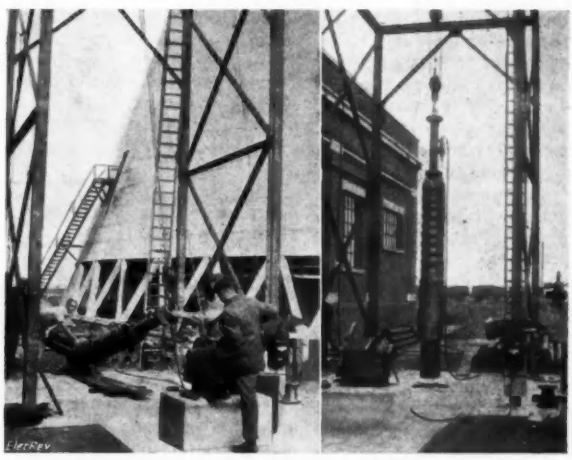


Deep-well equipment of this kind consists of a multi-stage centrifugal pump combined in a single casing with a submersible a.c. three-phase squirrel-cage motor of compact and simple design that will work "drowned" below the pumping level, not needing either foot valve or priming. In some designs the rotor is hollow and forms the intake to the pump.

The construction of the pump makes glands and stuffing boxes unnecessary, and no running joint is required to be watertight. Water lubricates the bearings and is allowed to pass right through the motor, so cooling its special windings while working at a highly rated capacity. The specially insulated stator wires that enable these motors to run under water have always been specially made for this company. Since the combined pump and motor driving shaft is well supported in long, water-lubricated bearings with water circulating round the rotor "air gap," vibration is avoided and silence secured. The connecting cables are brought out from the windings of the motor and pass outside the pump diffusion chambers to a watertight connecting box on the delivery pipe. From the connecting box they are brought up to the surface beside the delivery pipe, to which they are securely clamped.

Simplicity of Erection

A special cast-iron headpiece forms the delivery pipe bend at right-angles in a manhole on the surface, and is fitted with a cable clamping gland to secure the cables where they are led away to the starting switch. It is only necessary to concrete round the top of the borehole lining tube and then to set the headpiece on this as a foundation in the manhole below the floor for the suspension of the pump. By this arrangement no obstruction appears above ground level, and no housing is necessary. It will be seen that the pumps are simple to erect, and they can be easily taken out and examined when required.



A multi-stage borehole pump being placed in position at Brimsdown power station, and (right) suspended in position over the well

The controlling switchgear can be placed wherever desired on the surface, and may be of the automatic type actuated by the level of the water in the delivery tank, or the well, or by air pressure in a closed tank. The cheapness, handiness, and efficiency of the units have widened the field of application, and at the present time for de-watering foundations for docks or other excavations a number of pumps sunk in boreholes forming a ring round the excavations have been successfully employed to keep an area drained while excavations are proceeding.

The company has standardised borehole pumps of varying capacities for 8, 10, 12, 16, 20 and 24in., or larger, boreholes, and claims that the cost of submerged deep-well motor pumping is less than that of other method.

Electricity and the Ideal Home (*Concluded from page 486*)

"Servis" clothes-washing machines are moderately priced and of simple construction with all moving parts enclosed in an oil bath. The Kent Dish Washing Machine Co., Ltd., fits heating elements to its apparatus, which is self-contained with motor-driven water-circulating pumps. Electric potato-peeling and chipping machines are also available.

The Hurley Machine Co. (England), Ltd., demonstrates "Thor" clothes washers and ironing machines. The rectangular washer can be shut up to form a table top; it has a motor-driven water pump and the wringer and ironer are interchangeable with a food-mixing machine, all driven by one motor which is controlled by a time switch. A wireless set can be incorporated in the equipment. Beatty Bros., Ltd., have a display of washer-wringers and ironing machines. Stokes Appliances, Ltd., show their handy table cooker.

Gearing for Small Motors. By T. J. Curtis

FRACTIONAL horse-power motors are sometimes of greater advantage when coupled to gear-reduction units. The manufacturer, therefore, has designed gear units integral with the motor to reduce overall dimensions, facilitate fixing, and generally to obtain a more pleasing appearance, which is not only a selling point, but an essential feature when the application is in a laundry or a similar industry where neatness is all-important.

It is necessary, first, to consider the characteristics of the motor to which the gear unit is to be coupled. The small universal series-wound motor is often used because it is suitable for a.c. and d.c. mains, and also it has a frequency range of 25 to 60 cycles. The gearing problem in this case is complex, for the speed varies with the load. If the correct torque is not applied the speed will vary from that which is required, irrespective of any gearing. These motors, therefore, are only suitable when the load is constant, unless a variable series resistance is fitted for adjusting the power corresponding to the alteration of the load. To keep a uniform speed a fan is sometimes assembled to the motor shaft to balance the loading. Both d.c. shunt and a.c. induction motors maintain a constant speed with a varying load, and thus the difficulty is removed from the point of view of the final r.p.m.

Competition in the selling of these machines has increased the adaptability of standard units marketed by various firms. Thus, as materials, machinery, workmanship, production, &c., are much the same in all up-to-date factories, it is only by the resolving of these into the design that the manufacturer is able to obtain preference over his competitor.

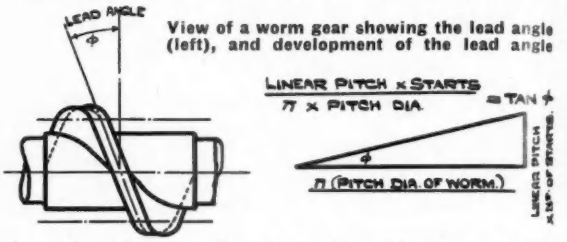
In many of the standard gear units it is possible for the final shaft to be fitted in one of four positions relative to the fixing holes in the gear box or motor feet. The final drive-shaft extension is generally of a robust diameter and the bearings adequate to take a considerable overload.

Type of Gear

Many of these machines require a very low-speed reduction, which in most cases means the application of worm gearing, for this type of gear reduces the overall dimensions, although it is not so efficient as the spur-tooth gear. In worm gearing the angle of lead of the worm determines the efficiency, *i.e.*, the greater the angle of lead up to 45 deg. the higher is the efficiency. Multiple threads are used to obtain a good lead angle, and this, to maintain the required ratio, increases the diameter of the worm wheel.

Silence is essential for these small machines, so that many manufacturers in their standard products fit bakelite fabric worm wheels to ensure noise reduction. When the gears mesh metal to metal it is important that the lubrication should be efficient, especially where there is a high peripheral speed, as in the first stage of reduction. If the lubrication is neglected there will be an increase in friction and heat generated, thus a general loss in the overall efficiency of the machine. The life is also shortened.

In heavy engineering such reductions as 1,000 : 1 and 2,000 : 1 do not generally have to be considered, but in the case of small power units the ratios stated are necessary because motors are economically wound to run at high speeds. Therefore, when there is a demand for drives of a few revolutions per minute the final torque is much greater than one would anticipate from so small a motor, though speed is reduced through the gears.



View of a worm gear showing the lead angle (left), and development of the lead angle

An Example

As an example, let us consider a motor of 1/40 h.p. at 2,500 r.p.m. fitted to a reduction gear box with a 500 : 1 ratio. Assuming a double-reduction worm train of 25 : 1 and 20 : 1 is used to obtain the desired final speed of 5 r.p.m., and that the efficiency of each is 70 per cent., the following calculations show the final torque: $H.p.=2\pi NT/33{,}000\times12$, where N = r.p.m. and T = torque in lb./in. Therefore, 1/40 h.p. = $2\pi\times2{,}500\times T/33{,}000\times12$ and $T=1/40\times33{,}000\times12/2\pi\times2{,}500$ lb./in. Thus, torque of motor = 0.6 lb./in. and torque of final drive = $0.6\times500\times0.7\times0.7=147$ lb./in.

When submitting figures as a basis for the design of a gear unit it is essential that the final torque should be stated rather than the motor horse-power. If the horse-power of the motor only is given it is impossible for the designer to ascertain the correct torque for the machinery which it is to drive. As already stated, the efficiency of the transmission through the gear train depends largely upon the lead angle of the worm, and as this is not constant for a given speed ratio there is nothing definite, apart from the input power, for the designer to work upon.

Should Salesmen be Able to Cook? By L. Norris

Methods of ensuring satisfied consumers

RECENT statements and discussions in this journal have given the impression, to the writer of this article at any rate, that the average electricity salesman is not very well informed on the correct uses of the electric cooker. If, as is apparent from recent correspondence, the minor operation of boiling eggs is not understood properly, then it is logical to presume that the major functions of the electric cooker are mysteries only partially comprehended by those whose days (and nights) are spent in crying its praises. These praises do a great deal of good, no doubt, but how much greater would be their effect if the salesman really knew what he was talking about. He may be fully aware of all the advantages of the electric cooker, but his sales talk must lose a good deal of its force if he cannot discourse intelligently on what the cooker will have to do when it is installed.

A salesman should be able to talk about cooking, and what is perhaps more important, he should be able to cook—simple dishes at any rate. A motor car salesman must be an expert demonstrator if he wants success, and so must a vacuum cleaner salesman. Similarly with almost every speciality salesman who is endeavouring to sell an article as distinct from a service. Why, then, should not a cooker salesman do the same? He cannot, of course, operate an electric cooker as one can a vacuum cleaner, and, in any case, demonstrations before sales may safely be left in the hands of the ladies usually employed for the purpose by supply authorities. It is demonstrations after sales that the salesman should provide. He should not drop a customer like a hot coal immediately an order has been obtained. It is necessary to make a few calls after delivery to see that the apparatus is giving satisfaction, and is being used correctly, and the ability to cook will be found invaluable.

The average housewife cannot be expected to make an immediate success of electric cooking if several years have been spent getting used to some other method. The habits of a lifetime are difficult to eradicate. The first few days' use of an electric cooker will result in some cooking failures, and although in nearly every case the housewife could overcome her difficulties without expert assistance in a fairly short space of time, it is not wise to allow her to learn from experience, as she is liable to be left with the impression that cooking by electricity is not so simple as it actually is. She may become perfectly satisfied in time, but she may believe that the excellent results obtained are due to her own efforts, not giving sufficient credit to the cooker. When a person is in this state of mind recommendations are not likely to be so enthusiastically given as they would be if it were believed that the results were due to the cooker, not the cook.

The salesman should make it his business to call as soon as possible after a cooker has been installed to see what results the consumer is getting. Unless the housewife is exceptionally brilliant there will undoubtedly be several queries, and the salesman should be able to answer these in a satisfactory manner, making himself generally useful by seeing that the consumer is using the cooker correctly and is obtaining the wonderful results which were claimed for the cooker before the order was taken.

Incidentally, " follow-up " calls of this nature prevent the salesman from making sweeping statements, which, to say the least of it, are not completely true, when endeavouring to persuade consumers to install electric cookers. For his own sake, his sales talk must give a true description of the results that will be obtained, as he will be called upon to prove the truth of his statements if those results are not forthcoming.

It is not intended to belittle the efforts and capabilities of lady demonstrators, for they are indispensable at public demonstrations in the showroom, but this is their chief work and they cannot possibly spare the time to "nurse" individual consumers through their first few days with an electric cooker. A lady demonstrator should make a routine call about a fortnight after installation, by which time any queries which may still be outstanding will make her feel that her cookery degrees (if any) have not been obtained in vain.

The result of the treatment advocated should be a satisfied consumer every time, and a satisfied consumer is a recommendation to others, even if only passively so. When there are no apparent faults in an article it cannot be spoken of slightingly; it must either be praised (however mildly) or it must not be spoken of at all, and the latter alternative is infinitely preferable to definite condemnation.

At the present stage of the development of the domestic load we depend to a great extent on direct recommendations, by satisfied users of electric cookers, to their friends and acquaintances, and these recommendations will not be given unless the user is really satisfied. Therefore the first consideration of an electric cooker salesman after obtaining a sale should be to make the consumer sure in her own mind that she has done the right thing in installing an electric cooker, and then her friends will eventually wish to follow her example. These friends will require a little pushing, of course, but the salesman will find them easier to deal with than persons who do not know a satisfied user.

Follow-up calls after the installation of a piece of apparatus are also important from the point of view of the additional business that is possible. It is not always possible to sell or hire an electric cooker and, say, a water heater at the same time, but one is an excellent advertisement for the other providing satisfaction is being obtained. When a consumer sees what electricity can do in one application she is ready to consider it for other uses, and the salesman should see that he is acquainted with all possible applications of electricity in the home.

Dispelling Dissatisfaction

We cannot afford to ignore the fact that there are some dissatisfied users of electric cookers in certain districts, and there have been cases of consumers discarding electric cookers, and going back to gas. It is, of course, unsatisfactory results and/or comparatively high running costs experienced that lead a consumer to such an unfortunate change of mind, and upon inquiry it will be found that the electric cooker has been used incorrectly. As every salesman knows, there are people who will be dissatisfied with anything, but they are fortunately very rare.

The genuinely dissatisfied consumer, however, can cause quite a serious slowing-up in the development of the domestic load. If these consumers would come out into the open and bring their complaints to the supply authority it would be a simple matter to cure their troubles, but they think their complaints are of too trifling a nature to merit serious consideration, and the result is that they get the impression that the electric cooker is no better than a good gas cooker, and they tend to discourage anyone who may ask their advice about cooking by electricity.

What the Building Boom Means. By A. C. Hazel

Tremendous possibilities in sight

LAST year was a "boom" period for the building industry, and this one is likely to be even better. According to the Council for Research in Housing Construction, the figure of 250,000 a year for the next ten years is not unlikely. This represents a possibility of 2,500,000 new consumers from new property alone.

Furthermore, the total number of houses being built each year is increasing rapidly. If we look back to 1930-31 we find that private enterprise was responsible for building approximately 125,000 houses per annum, whereas for the period 1933-34 the figure increased to 200,000 houses per annum. In addition to this there is a figure of 15,000 for Scotland. For the year ending March 31st, 1934, private enterprise was responsible for 266,000 houses being erected, and building is still on the upward trend.

Electricity is making its presence increasingly felt in the large new blocks of flats and in new building estates. Modern houses range in price between £325 and £1,000, the most popular house being the one sold at £650 complete. This house could be purchased by paying £50 down and the balance in weekly payments of 17s. 9d.

I recently inspected two typical houses. The first one cost £325, and was being paid for by a deposit of £30 and the balance in weekly amounts of 9s. It was part of a block of six well-built houses, with a large garden at the back and front. It had a small hall, with a sitting room leading off. Adjoining the sitting room was the dining room, and off the dining room was a kitchenette, complete with a boiler. Upstairs there was a bathroom and two fair-sized bedrooms.

I interviewed three of the tenants, with the result that we expect to have at least three all-electric houses in that block. It appears that the average income is £3 per week, and out of this 9s. is set aside for rent, 2s. for rates, and 4s. for coal, gas, etc. Working on a basis of 1½d. per kWh as the average price, including the standing charge, we found that our consumer could, with advantage, adopt electricity as follows:—

	s.	d.
Hire of cooker, 4d. per week		4
Cooking for two adults and two children	1	10½
Lighting and radio (3 kWh.)		3½
Iron and occasional bowl fire		2
Wash-boiler, including hire		6
Total	3	2½

It will be found that this class of consumer usually prefers to hire-purchase her appliances, if possible, providing the terms are reasonable.

Most undertakings nowadays hire electric cookers and wash-boilers and install them free. It is therefore good practice to negotiate with the builder beforehand and wire the points while the house is being constructed, thus avoiding the pulling about of a new house—one of the chief reasons why "prospects" turn down electricity after they are comfortably settled.

The other house visited was one costing £650 complete. It was semi-detached and also possessed a large garden; it was being purchased by paying £50 down and weekly amounts of 17s. 9d. It was a modern house—a large hall, a sitting room with large bay windows, divided from the dining room by sliding partitions, a kitchen and scullery. Upstairs there were three bedrooms and a bathroom.

In a similar house the electrical installation is as follows: In addition to the usual lighting arrangements, there is an electric cooker and a wash-boiler in the scullery, the kitchen being used as an extra reception room. There is a built-in electric fire in the dining room, obviating one chimney, and 15-A to 5-A fused plugs in each bedroom and the kitchen for portable electric fires. The total cost of the complete electrical installation, including apparatus and wiring, only amounted to a little over £35, whereas over £45 was saved on the chimney alone. It will, therefore, be seen that we have a very good proposition to put before builders.

We have recently completed an installation in a house costing just over £700, which is being purchased by paying £70 down and 18s. 3d. per week. This is "ultra-modern," with a flat roof and very long windows taking up practically half the outside wall space. Here built-in fires are installed in the two bedrooms, and also in the dining room and sitting room. A ball-valve control water heater is fitted in the bathroom to feed the bathroom and the kitchenette immediately underneath. An electric cooker is also fitted in the kitchenette. The whole installation, including wiring, &c., costs £45, against a saving of £85 on chimneys, plumbing, &c. Electricity is supplied at 1d. per kWh, plus a small standing charge.

Incidentally, it might be as well to mention that we find that the average consumption per annum of an electric cooker is about 650 kWh, and not the usual 1,000. However, to revert to the 250,000 new houses, the foregoing is merely to show how easy it should be for us to make every new house of the type mentioned all-electric.

Millions of Units

If we were fortunate enough to do this we should sell, allowing an average of 2,000 kWh per house per annum, the colossal number of 500 million kWh. If only 20 per cent. became all-electric we would sell 100 million kWh. In addition to this, think of 250,000 cookers sold and 250,000 water heaters!

E.D.A. is going very thoroughly into the question of getting the full co-operation of builders and architects, but I feel that the best way of getting a builder or an architect electrically minded is to first of all make the builder's house all-electric.

I would suggest to supply undertakings anxious to co-operate with builders, and architects with regard to their housing schemes, that the easiest plan is to get into touch with the editor of the local newspaper, who can invariably give one all the information required regarding immediate and prospective building work in the district.

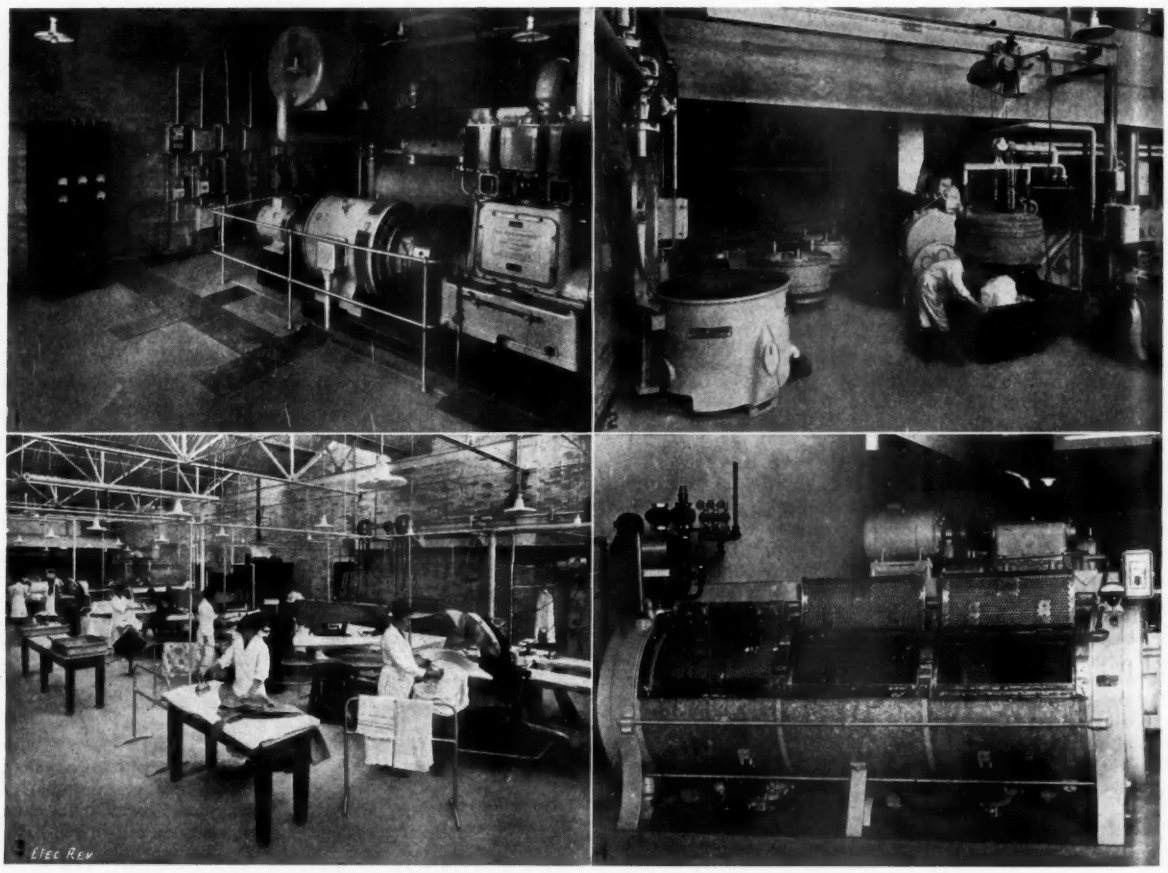
Electricity in a Modern Laundry

HOW much the modern laundry relies upon electricity is admirably demonstrated at the new premises just opened by the Southern Co-operative Laundries, Ltd., at Gudge Heath Lane, Fareham, Hants, to serve the whole of the districts covered by the Portsea Island, Winchester, Southampton, Farnham, Andover, Basingstoke, Parkstone and Bournemouth Co-operative Societies.

The company produces its own electricity supply by means of a 125-kVA, 500-r.p.m. 400-V 50-cycle, three-phase English Electric generator driven by a Belliss & Morcom steam engine (120 lb. per sq. in. working steam pressure) and direct coupled to a 267-kW, 35/110 V, 245-A balancer. The pressure, load, etc., are indicated on an English Electric instrument board.

From the bus-bar chamber the supply passes to three "Glasgow Rex" switches (two 60-A and one 100-A). These control all the circuits to the heavier machinery operating at 400 V. A neutral link connection to a fourth 30-A switch provides the supply for the lighting circuits, the ventilating system and the smaller apparatus such as the hand irons, neck-band starchers, tab machines, etc., which operate at 230 V. Space has been left in the engine room for a duplicate generator which will be installed when the second section of the building is erected in the near future.

An alternative 230-V supply is also obtained from the Fareham Urban District Council's mains, this being controlled by two 60-A and one 100-A "Superior" switches with "Walsall" and "Presto" fuseboards.



Some of the Plant in the Southern Co-operative Laundry

1. The Belliss & Morcom-English Electric generating set with instrument board and switchgear. 2. Emptying articles from their container after treatment in the hydro-extractor on the left. 3. The pressing section. 4. A 40-in. by 110-in. "Matchless" washing machine

The Processes Described

After being taken from the vans drawn up in the receiving bay, the articles to be washed are transferred, *via* an electrically operated lift (Express Lift Co.), to the sorting and marking booth on the first floor. From here three C.W.S. conveyors (a special one of which is provided for articles already marked) take the various items to hoppers and classifiers.

The articles placed in the hoppers are gravity fed to the main laundry directly into a 40 by 110-in. "Matchless" motor-driven washing machine with nine valve type automatic control and dual formulæ drums. Garments, etc., from the classifiers are placed in one or other of the smaller washing machines, of which there are four, according to the material—flannels, for instance, being placed in a 40 by 42-in. machine of a somewhat similar design to the washing machine already mentioned.

By the use of automatic control on these washers the whole of the process of washing and rinsing is carried out automatically. Hot and cold water and soap, soda and blue solutions are automatically admitted in the right proportions and at the right temperatures, thus obviating any undue strain on the fabrics. The water pressure on the automatic controls is kept up by means of a "Mopump" booster pump and compressor installed in the adjoining store-room. Igranic automatic starters are fitted to the washers.

The hot water for the washing machines is obtained from an 8 by 14 ft. Davey Paxman self-contained coal-fired economic boiler (120 lb. per. sq. in. working steam pressure). A dual pattern calorifier has also been installed capable of utilising 3,000 lb. of exhaust steam per hour and raising 3,000 gals. of water per hour from 50 deg. to 180 deg. F. Incidentally, all the water used in the laundry is softened by a "Permutit" base-exchange water softener, which can deal with 35,000 gals. of water per regeneration.

After treatment in the large washing machine, articles are lifted, still in their container, by a one-ton Morris electric hoist direct to a "Matchless" motor-driven hydro-extractor, where all the surplus water is removed. This hydro-extractor, as well as the two others dealing with the articles from the other washing machines, is driven by a Lancashire Dynamo and Crypto electric motor controlled by Igranic starters.

From the hydro-extractor the various articles are sorted out and placed into square wooden boxes, which are carried on trolleys to the appropriate machine for the first stage of the finishing process.

The Finishing Department

Blankets, towels, woollens and flannels requiring a soft finish go to a "Matchless" motor-driven air ironer, which by creating a temperature above boiling point obviates the possibility of shrinkage, raises the nap, and imparts a remarkably

MEETINGS AND DISCUSSIONS

Current Topics and Opinions Expressed at the Institutions

The Faraday Lecture

THIS year the annual Faraday Lecture of the Institution of Electrical Engineers, which has been delivered by Prof. E. W. Marchant at the various provincial centres and in London on April 4th, dealt with "Electricity in the Life of To-day."

According to Dr. Marchant the capital at present invested in electricity supply undertakings is over £450 millions, and in addition the Post Office controls electrical plant to the value of £130 millions. The electrical industry is now the fifth largest in the country. Electricity is nowadays employed in medicine, for diagnosing diseases of the heart and it is used by the surgeon in his operations, and by the physician for the treatment of disease. Experiments with radium, which emits charged particles of electricity, have proved it to be one of the most effective means of dealing with cancer. The telegraph can now send ten messages along a cable in the same time as it took to send one message when the first Atlantic cable was paid.

[Lafayette

Professor E. W. Marchant, D.Sc.

When Joseph Swan produced the first incandescent carbon lamp in 1879 he obtained an efficiency of about 3 lumens per watt, whereas in the new discharge lamps the figure is over 25. The standard of illumination in a factory may nowadays be as high as 30 ft.-candles, instead of the two or three that used to be considered satisfactory. Electric lighting has always been the most convenient method of illumination and to-day it is also the cheapest. Electricity has done more than any other single agent to reduce domestic drudgery.

During the last ten years the average efficiency of electric power stations has improved by over 50 per cent. Whereas in 1923 the average electrical energy generated per ton of coal consumed in British power stations was 800 kWh, in 1933 it was 1,350 kWh.

In the most efficient of power stations to-day over 2,000 kWh is produced from every ton of coal, and the thermal efficiency of those stations is approaching 30 per cent.; that is, they are able to convert to electrical energy nearly 30 per cent. of the heat energy available in the coal. The ordinary domestic fire, as a rule, also has an efficiency of less than 30 per cent., but electricity has the great advantage that it can produce heat wherever it is wanted, and an electric heating installation is therefore both economical and efficient.

It is time, said Prof. Marchant, that the burning of raw soft coal was forbidden in cities, as it has been in New York for many years. The use of electricity for domestic heating will do more to free cities of smoke than anything else, and in this way will help, as statistics have already shown, to remove the cause of many chest diseases. Gas fires may eliminate smoke, but they do not get rid of sulphurous fumes; electricity does both.

An inquiry which was conducted in Chicago before the railways were electrified revealed that the worst offender from the point of view of smoke production was the steam railway locomotive. It is time, says Dr. Marchant, that all suburban locomotives were electrically driven. Electrification would add to the comfort of travel, provide work for many unemployed men and, moreover, as Lord Weir's report had clearly shown, would pay.

Electricity is used increasingly on farms and in gardens and it may be used for soil heating and the raising of early crops. Nowadays, many large generating stations are "time controlled," and in consequence an electric clock connected to the mains keeps as good time as the best chronometer. Electric traffic signals control a large proportion of the traffic in our large towns; they are timed by the discharge of an electrical condenser.

Electricity makes it possible for us to speak by telephone to 90 per cent. of all the world's telephone subscribers, but perhaps the greatest service electricity gives to-day is broadcasting.

Makers and Users of High-voltage Cable

IMPRESSIONS gained during a year spent in the United States are recorded in the paper which was read by Mr. R. C. Mildner before the London Local Technical Group of the Electrical Power Engineers' Association on March 25th.

The author briefly refers to differences between American and British (or European) cable practice, concluding that the chief lesson to be learned relates to the organisation of users and manufacturers. On the one hand the Americans have the Insulated Power Cable Engineers' Association, representing the manufacturers, which does a certain amount of co-operative research and consults with the utility companies in the revision of specifications. On the other hand the majority of the utility companies work together in the Association of Edison Illuminating Companies through the medium of their High Voltage Committee, which watches development in cable technique, suggests revisions in purchasing specifications when necessary, and assists in the co-ordination of research projects by the member companies and among outside bodies, in so far as they are supported financially, or by associations of utility companies.

Reports are issued annually on the activities of the past year, and one most important section deals with the compilation of statistics relating to the operation of high-voltage cable. Much valuable information has been derived in the past from a consideration of life records in relation to operating conditions, and has formed the basis of research that has given a clearer picture of the physical processes which occur in service.

In this country the functions of these two bodies are covered by the aggregated efforts of the technical committees of the Cable Makers' Association, the Electrical Research Association and the Institution of Electrical Engineers, but this arrange-

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Electricity in a Modern Laundry (*Continued from preceding page*)

soft finish. Starched articles, such as table linen, requiring a particularly high finish, go to a ribbon-feed "Decoudon"; while sheets, pillow cases, and similar articles are dealt with in a six-roll 120-in. auxiliary roller "Universal" calendering machine which is controlled by an Electrical Apparatus Co. switch with "Memrex" fusebox.

From the various systems of calendering the work is again sub-divided. A few items are finished by electric hand irons, but the majority pass to one of the dozen or so presses specially designed for each particular type of article. A large portion of the pressing section is devoted entirely to shirts and collars, a number of the machines for which are driven by an 8-h.p. B.T.H. motor fitted with automatic starters. This motor also provides the power for a goffering machine. Two of the general utility presses used for some of the more absorbent articles are fitted with electric motors which suck up the moisture. A Broom & Wade air compressor, driven by a 10-h.p. 1,420 r.p.m. Crompton Parkinson motor fitted with starter is used for the presses. The finishing process completed, the articles are carried to racks and packing tables from which they pass out into the adjoining despatch room.

The problem of getting rid of surplus steam and keeping the air pure has been solved by the use of the British Thermolier ventilating system (Mather & Platt, Ltd.), while to provide adequate artificial lighting Benjamin industrial type fittings have been installed. Electric clocks (International Time Recording Co.) throughout the building, as well as the time-keeping machine are controlled by a master clock in the manager's office. The various departments are kept in touch with each other by a Reliance automatic telephone system.

The building has been so designed by Mr. H. G. Wilding, the chief architect to the Portsea Island Mutual Co-operative Society, that by removing the brickwork of a wall at the rear, the laundry can easily be enlarged to twice its present capacity. So large is the anticipated business that it is practically certain that the extension will be undertaken very shortly.

The whole of the laundry plant and machinery was supplied and installed by Messrs. Baker Perkins & Co., Ltd., the electrical installation work being undertaken by Messrs. F. W. Cook & Co., of Southampton.

ment loses something in the author's opinion from the fact that the cable-users are not organised as a class to deal with those problems in which they are particularly interested and which they are peculiarly fitted to solve by joint effort and co-operation.

A more effective organisation visualises, then, the existence of parallel bodies, representing the cable-makers and the cable-users, which could deal with their own individual problems and contribute to a common research organisation which would solve matters of common interest. The elements of such an organisation are already in existence and could easily be adapted to achieve the purpose outlined above.

Furthermore research in this country has yet to be organised and co-ordinated on national lines in a manner comparable with the state of affairs that obtains on the other side of the Atlantic; in particular, methods should be devised to secure the most profitable employment of post-graduate research, both by ensuring that it is directed into the most useful channels and by assisting individual colleges to prosecute a continuous and progressive attack upon any approved programme of research.

In opening the discussion Dr. D. W. Robinson suggested that the larger number of failures of cables in America, in spite of a larger dielectric wall, was due not only to the higher temperature rating of the cables but also to the higher frequency (60 cycles as compared with 50 cycles in this country).

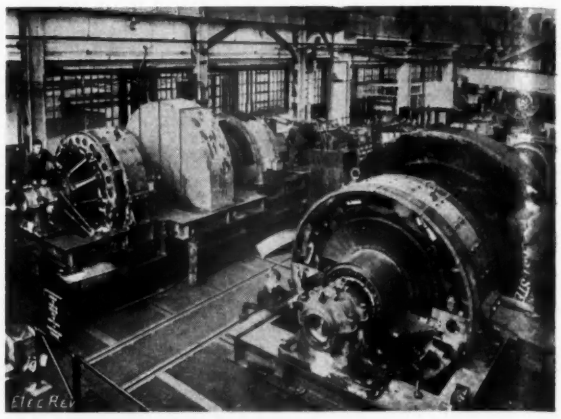
In reply to Mr. G. M. S. Sichel the author said that in New York and Chicago, where the cables were in ducts, a leakage of oil could usually be located sufficiently accurately by observing the pressure drop at the two feed reservoirs. No explanation had been given of the reason why the faults were mostly at the joints.

Mr. E. H. S. Bullen remarked that statistics indicated the reliability of the oil-filled cable under high-voltage conditions. Size for size the oil-filled cable was dearer than the solid type, but it should not be viewed from that angle. Its ability to operate at high temperatures with complete safety and to carry a much larger current showed that there was a definite economic advantage in using this type. Undoubtedly inspection served the good purpose of disclosing any incipient trouble, and it should not be a serious item when compared with the cost incurred in putting right a completely broken-down cable and the resulting loss of revenue. The author had pointed out that there had been no case of electrical failure of an oil-filled cable in America and it was equally true to say that there had been no such failure either in Europe or in this country.

The author said that increased dielectric losses which led to heating of the cable had caused certain lengths of oil-filled cable to be replaced although not absolutely necessary. There was no agreement as to the cause of the losses. In Chicago they had been serious, but nothing of the kind had been experienced in New York.

Mr. W. J. Jeffery remarked that certain well known American engineers had expressed the opinion that there was no reason to think that the high current rating had any effect on the number of failures. He believed a great deal more would be heard of corrosion trouble in the future. Grease compound used for lubricating the cable during the drawing-in process would not reduce chemical corrosion, because after a short time the compound would probably find its way to the bottom of the duct. He regarded reducing the lead thicknesses as a step in the wrong direction. Investigations in this country indicated that a great number of faults which occurred near joints were due to the fact that the cables were laid in ducts.

Mr. W. F. Andrews, the chairman, said he was not altogether enamoured of the duct system built of concrete blocks. A good coating of grease was of real value because they had pulled cables out after they had been in ducts for many years and found the coating of vaseline still there.



In his speech at the B.T.H. annual meeting Mr. W. C. Lusk referred to important orders received from South Africa. Our picture shows two motor-generator sets for East Rand Proprietary Mines, Ltd., under construction at the Rugby works. Each has a 40-ton equalising flywheel and a new type of rotary slip regulator

Electric Pumping in Mines

"THE Science and Practice of Borehole Pumps for Mining work" is the title of the paper by Mr. G. A. Atchley that was read before the Association of Mining Electrical Engineers on April 2nd.

The author's method was to show numerous lantern slides illustrating modern borehole pumps and, briefly, to describe their essential features and applications to colliery drainage. The examples cited ranged from a 5-h.p. motor driving a pump delivering 100 gallons per minute from a depth of 40 ft. to a total of 54 ft. above ground level, to equipment driven by an 800-h.p. synchronous induction motor. The size of this plant may be imagined from the statement that the height to the top of the exciter is a little over 16 ft. from the base level. The streamline effect of the fabricated equipment was mentioned, the duty being 4,162 g.p.m. (six million gallons a day of twenty-four hours) against a head of about 450 ft. The maximum efficiency of the pump reaches 84 per cent.

The author states that no limits of size or head are likely to be met with in any mining installation in this country. As regards head, plants are working with upwards of 700 ft. of rising main between the surface and the pump, and heads of 1,000 ft. are certainly well within the capacity of present-day methods of manufacturers.

As regards space, the author's personal experience has been associated with pumps from 5 up to 40 in. in diameter, and as illustrating what can be done by a very small pump of the propeller type he states that the maximum volume obtainable from a 5-in. pump is 215 gallons per min.

In mining work the art of using borehole pumps is comparatively new, but apparently it is bound to increase. There must be many cases now where abandoned pits are having water raised by costly methods, involving much labour in descending and ascending shafts, the keeping of underground workings in a condition which meets the Regulations for the Use of Electricity in Mines, and always subject to the anxiety that plant may be drowned out. With the borehole pump, provided the shafts can be regarded as safe from collapse, descent of the pit is entirely unnecessary. The whole of the driving equipment is at the surface and no matter how high the water rises, the plant cannot be drowned out.

Rubber Latex as a Manufacturing Material

IN the course of a lecture on this subject at the Royal Society of Arts in London on April 1st, Dr. D. F. Twiss, chief chemist of the Dunlop Rubber Co., Ltd., made reference to the electrodeposition of rubber. He said that there were two possible methods of procedure; the deposit might be formed directly on the anode, or on a porous diaphragm surrounding the anode and keeping the latter from contact with the rubber dispersion. The current densities applied were small, of the order of 1 A per sq. decimetre. When an electric current was passed through latex around a suitable anode, *e.g.*, of zinc, the anode was not insulated by the rubber deposit which formed on it. The deposit was porous and permeated by serum, so that electrodeposition continued to occur on the rubber deposit already formed.

The deposition was, therefore, essentially not electrophoretic, but was effected by zinc ions formed at the anode and migrating under the electric stress to the exposed surface of the deposit. Deposits of considerable thickness, *e.g.*, up to 1 cm. or so in thickness, could therefore be built up rapidly on the anode by this special form of "ionic coagulation." The compounded rubber dispersion was kept well stirred, so that the electric current was not responsible for bringing the particles to the anode or anode diaphragm.

The method of formation resulted in the deposit having the various ingredients in the same proportion as the bath itself. As a dry weight of 3 g. of deposit was obtainable per amp. per min. under good conditions, the rate of electrodeposition per unit current was over 1,000 times that of the cathodic deposition of zinc. This large difference was attributable mainly to the large size of the rubber globule in latex relative to the atomic magnitude of zinc. For the production of hollow rubber articles it was possible to use a suitably shaped porous

diaphragm (or former), *e.g.*, unglazed clay, around the anode, containing an electrolyte, *e.g.*, calcium chloride solution, in which the anode was situated. An advantage of this arrangement was that any anodic electrolytic gases were liberated away from the rubber deposit, and so could not lead to the inclusion of bubbles therein.

When manufacturing by direct deposition on an anode, whether the deposit was to remain permanently on the anode or was to be stripped therefrom, the need to prevent concurrent liberation of gases at the anode called for special measures. For instance, the degree of alkalinity of the latex should be reduced to the minimum. Another precaution was to ensure that such electrolytes were present as would not give gases; another was to keep the potential difference at the anode below that necessary for the liberation of gaseous oxygen. The most effective device was to use an anode of a metal which would be attacked at once by the liberated anions. Iron would suffice, but zinc or cadmium, particularly the former, was much more acceptable. Just as the negatively charged particles in aqueous dispersion under electric stress tended to move to the anode, so a liquid in a capillary or capillaries of a solid (with a negative charge relative to the liquid) under electric stress tended to flow in the direction of the cathode.

If the latex, compounded or otherwise, was contained in a permeable vessel, *e.g.*, of unglazed clay, the cathode could conveniently be placed in a bath of suitable electrolyte, such as dilute ammonia, surrounding the permeable latex container. While the current was being passed, electrodeposition took place on the anode (or anode diaphragm) and serum simultaneously flowed from the latex bath through the permeable wall of its container to the exterior space around the cathode, whence it could overflow to waste. Under the practical conditions usually obtaining in the treatment of a 35-40 per cent. dispersion of compounded latex, this removal of serum compensated closely for the anodic loss of rubber, &c., so that the concentration of the bath was automatically maintained constant. It was necessary only to replenish the bath with additional quantities of compounded latex.

Alternator and System Stability

THE paper in which Mr. W. D. Horsley reviews the stability characteristics of alternators and of large interconnected systems (to which reference was made in our last issue) was discussed at the Institution of Electrical Engineers in London on March 28th.

Mr. J. Hacking remarked on the small amount of information about this subject published in this country as compared with the data available in the United States. This showed that in England the subject had not been really troublesome. The effect of varying alternator speed was important and more information about it was needed. The speaker outlined the result of an investigation into a 110-mile 132-kV line with a 60,000-kVA transformer at the sending end which indicated that the grid had been so designed as to remove all reasonable risk of instability.

Mr. W. D. Horsley is with Messrs. C. A. Parsons & Co., Ltd.

Mr. H. A. Ratcliff said that although the paper did not contain anything startlingly new it was a very clear enunciation of phenomena that had not been appreciated as they should have been. He was surprised that the author had made out a case for the shunt-wound exciter, as in practice the cascade exciter seemed to have advantages and also lent itself to some measure of field forcing.

One of the chief causes of alternator instability had been the operation of machines with a leading power factor when they were designed for a lagging p.f. Also the practice of maintaining interconnected transmission bus-bar voltage by means of p.f. control must be blamed. Power-factor correction was good so far as it went, but he hoped it would not be pushed so far as to introduce instability. It might be advisable to specify alternators for working with a p.f. of 0.9 or 0.95 instead of the more usual value of 0.8.

Cases of system instability were very few and far between, but he had experienced examples of apparent instability caused by faults on the line. That sort of trouble could be avoided by increasing the overload settings and introducing time lag, which would enable the system to hold together.

Mr. F. G. Everest pointed out that the synchronous reactance of turbo-alternators was much greater in this country than in the United States. It formed the major portion of the total reactance of the system and therefore machines feeding short lines were operating much nearer to a state of instability than was generally realised. The speaker enumerated objections to high-speed excitation which, he said, could not be recommended except perhaps in the case of synchronous condensers. Automatic frequency control would not be likely to assist the stability of systems. The best means of tackling that problem were fast relays and quick-acting switches.

Mr. B. Wood suggested an alternative way of proving conditions of maximum output (appendix 3). Field forcing was a bogy which had not yet been laid, though its death knell had been sounded at last year's Paris Conference. He doubted whether it could be done sufficiently quickly to be of any real use, and those who had tried it had now abandoned it.

Mr. W. D. Horsley, in reply, agreed that there had been very few instances of instability in this country, and it was reassuring to learn that the design of the grid was such as not to cause it. He agreed also that the cascade exciter was to be preferred, but the shunt type was used for small generators and there was still a demand for small machines. Former papers on this subject had failed to make clear the distinctions between the finer forms of instability.

Heat and Power as By-products

OPENING an informal discussion at the Institute of Fuel in London on March 29th, Mr. C. S. Darling, of Messrs. Rickett, Cockerell & Co., Ltd., coal merchants, discussed the possibilities of obtaining heat and power as by-products in the operation of works steam plants, and indicated some of the financial advantages to be obtained as compared with purchasing electric power, even at very low prices, from public supply mains. He divided the general problem into (1) the utilisation of the full amount of steam passed to works process consuming devices for power production by means of a back-pressure turbine, and (2) waste heat boilers.

The general conclusions were that the steam flow to industrial plants was of such magnitude, and that industrial plants were so situated, that future electricity generating units should be allocated to these plants and not segregated in large hydro or condensing stations. It was urged that co-operation between the public power supply authorities and industrial power plants with regard to the mutual use of steam and electricity would reduce generating capital and operating costs, thus ultimately reducing the national fuel bill and/or power bill.

This would result in a wider use of electrical energy, but the tendency of the public utility engineers to combat these installations—which was too often felt by consultants—was only one of the expressions of the unsound economic conditions in power generation which had been fostered and maintained by the competitive electrical sales campaigns. It was necessary to educate industrial management on the lines of the apparent paradox that small-scale back-pressure power units were more efficient than quantity production in condensing stations.

It was suggested that twenty-five million tons of coal was consumed annually for works processes and heating purposes, which was said to be two and a half times the annual consumption of electric power stations in this country. If a committee could be formed to investigate ways and means of dealing with steam heating demands in the neighbourhoods of power stations it might be possible to secure an efficiency of 60 per cent. instead of the present 25 per cent.

Reference was made to what was being done in America and Russia in supplying steam or hot water from electric power stations, while other speakers expressed the view that it would be more economical to distribute heat in the form of gas or electricity without incurring the inevitable thermal losses in long lengths of pipelines. One speaker argued that the best policy was to give the supply that was wanted at the cheapest possible price and not worry about securing the highest possible efficiency, which might turn out to be extremely unremunerative.

A Symposium on Lighting

A symposium on illumination problems, with demonstrations and lantern slides, has been arranged for the next meeting of the Illuminating Engineering Society in London on April 9th. Contributions will include: "A Works Photo-Electric Method for the Photometry of Electric Discharge Lamps," by Mr. P. D. Oakley; "A Simple System for Recording and Displaying Measurements of Illumination," by Mr. R. R. Holmes; "The Use of Scale Models in Illuminating Engineering," by Mr. H. S. Barlow; and "Practical Considerations in Architectural Lighting," by Mr. H. Lingard.

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Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

E.D.A.'s Publicity Methods

I am afraid that your correspondent, "A.M.I.E.E.," who writes under the heading of "Physician Heal Thyself!" in your issue of March 22nd has jumped too quickly to conclusions.

In my criticism of E.D.A. publicity methods I wrote only as a member of the advertising profession, and not as "A.M.I.E.E." concludes an electrical engineer. Whether Mr. J. Baggs is an A.M.I.E.E. or an advertising man he does not state. I wonder how many A.M.I.E.E.'s know anything about advertising? Not many, I am sure, nor does one find many advertising men who profess to be A.M.I.E.E.'s.

"A.M.I.E." will find that advertising men are only too keen to take advantage of the uses of electricity whenever possible, either for lighting, movement or sound, and I am sure he will realise on second thoughts that both Mr. Baggs and I were criticising the publicity methods of E.D.A. and not E.D.A. itself. D. Mills.

Birmingham, *March 26th.*

A Skilled Man's Plaint

With reference to recent articles bearing on the above subject I would put forward my own opinions, based on extended experience with both employers and skilled electrical workers, as to the reasons for lack of demand for skilled electrical workers to-day. In the first place, I put the blame on the skilled electrical worker because he is content to stand at the foot of the ladder shouting instructions to his mate or assistant who is at the top of the ladder. The latter fails utterly to do the work in the proper manner but the job gets connected. The mate gives himself a pat on the back and finally gets his full ticket from his trade union, which enables him immediately to enter into competition with his late instructor with the difference that the ex-mate has been used to doing the work and is prepared to continue to do it especially as he is getting an improved rate of pay. The employer prefers him because he gets exactly the same class of work as he got before but can now cut out the instructor. The net result is that the standard of electrical work goes down and the status of the skilled electrical worker is reduced.

Secondly, I blame the electrical contractors who very often are not electrically trained but simply men who would undertake anything so long as some financial gain could be got from it. They use the lowest grade materials with no system of installing and employ boys or semi-skilled labour without scruples or any pride in their work.

Registration of contractors by a body having no legal or other authority is likely to do more harm than good. To my knowledge there are many contractors who loudly proclaim the fact that they are registered, who carry out disgusting work which is subject to no inspection or supervision. The customer naturally comes to the conclusion that there is no difference between the work carried out by registered and non-registered contractors.

The time is ripe for compulsory registration of skilled electrical workers in appropriate grades, so that no electrical work of any kind would be carried out except by a certified worker having the necessary certificate. When a certified worker's job failed to come up to the necessary standard he would automatically be reduced to a lower grade. This, of course, implies the employment of inspectors with the necessary authority by the supply undertakers, to see that all work complies with the regulations applicable to the class of work. These regulations, prepared by the Electricity Commissioners, should be legally enforceable.

Of course the method of appointing installation inspectors would have to be carried out on a different basis from that employed by many local authorities who seem to specialise in recruiting their inspectors from the ranks of the pig breeders, cartage contractors, &c., and they should, of course, be persons capable of intelligently interpreting the regulations, and able to carry out the necessary tests.

Furthermore, I consider that the Electricity Commissioners should also institute a control over the class of accessories at present being marketed. Diehard.

April 2nd.

Does Registration Mean Anything?

In answer to the above question I would suggest that very often registration means that a mystic sign is provided which any sort of contractor can put on his letter paper to show that he has a "reputation" at stake on every job. It means, too, that supply authorities will connect an installation with merely a cursory examination, even if three 15-A plugs are put on a 10-A switchfuse and wired with 3/.036, and, in the case of c.t.s. work, it passes the test if it *looks* nice.

I know of one registered contractor who is doing conduit work at 6s. a point or thereabouts! Can a reasonable job be done and decent wages be paid at this utterly ridiculous figure? Unregistered.

April 1st.

Electricity Supply Law Clarified

IT is more than fifty years ago since the first Electric Lighting Act was passed and since that time numerous other Acts have been placed on the Statute Book. They are to be construed together, which means that they must be read as if they were all contained in one Act. As no attempt has ever been made to codify or consolidate them it is not surprising that managers of electricity undertakings, electrical contractors, consumers and employés should find it no easy matter to ascertain what the law is on a particular point which concerns them. What makes their task more difficult is the fact that orders and regulations having the force of law are constantly being issued and that both these and the Acts themselves are occasionally the subject of judicial decision.

A book which has been written by Mr. R. H. Studholme,* owes its origin to notes prepared by the author whilst acting as solicitor to electricity undertakers and is an attempt to co-ordinate and summarise the law so as to bring it within the compass of those who may not have had any legal training. The author has done his work well and has succeeded in putting into moderately simple language the main legal provisions governing electricity supply whilst at the same time by means of marginal notes he has enabled anyone to find the appropriate Section or Regulation on which each is based.

Mr. Studholme has adopted the method of dealing with each topic in a separate chapter. He commences with the constitution and functions of bodies operating in the electricity supply industry such as the Ministry of Transport, the Electricity Commissioners, the Central Electricity Board, local authorities, power companies and other authorised undertakers, and then deals with rights and obligations arising in connection with supplies to consumers, alterations of pressure or system, acquisition of land, bulk supplies, and mutual assistance. A chapter on charges and tariffs contains a fuller treatment of this subject than has yet been made available, and the references to recent decided cases throw a good deal of light on what has hitherto been obscure.

There are, of course, still many doubtful points which are awaiting judicial interpretation, and the author mentions these and occasionally ventures to give a tentative opinion.

There is an informative section dealing with employés, and particularly the question of compensation for loss of employment. This is again the only place in a book where this subject has been treated at any length. The author points out that the law regarding compensation is contained in no fewer than five different Acts and calls attention to the inconsistency between the provisions of the 1919 and 1926 Acts. He makes the pertinent remark that it is regrettable that it should be a matter of such difficulty for an employé entitled to compensation to understand his rights without legal assistance. The procedure to be followed in claiming compensation is also discussed and reference made to the views of the referee.

The subject of wayleaves is a very important and involved one, as are most questions affecting land. The information given by the author should prove very helpful to those who have to lay out transmission systems. Specimen wayleave forms are included in the appendix.

Many people will be grateful to the author for setting out in a table a complete list of statutory definitions. The book is quite up to date and incorporates the provisions of the 1935 Act in the text. Great care has been taken with the index, which is so essential in a book dealing with such an intricate subject. Supply engineers have not been too well served in regard to books on the law and there was a real need for a more popular exposition. They will find in this book much information for which previously they have sought in vain, and I therefore have no hesitation in cordially recommending it to their notice.—J. W. T.

* "Electricity Supply Law and Practice." By R. H. Studholme, M.A. London: Sir Isaac Pitman & Sons. Price 30s. net.

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

New "Vactric" Floor Cleaners

Many novel features, all constituting a considerable improvement on the older models, are incorporated in the new "Airflow" vacuum cleaner made by VACTRIC, LTD., North Circular Road, London, N.W.2.

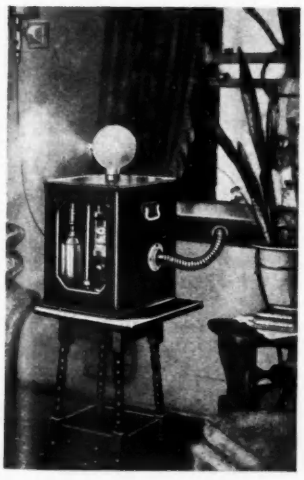
The machine is quiet in operation and is of the motor-driven brush type, a foot-operated switch being provided to give half-speed working. Seven nozzle heights are available, a change in the height being effected by the "Pres-toe" adjustor to the left of the motor. An indicator on the right above the nozzle gives the user a clear indication of the nozzle height without bending down. The cleaner is carried on four roller bearing castors and a rubber bumper is fitted. The special design of the "Witch-way" handle enables steering to be carried out by merely twisting the wrist. A pistol grip handle with a toggle switch, and a headlight are incorporated. The cleaning radius is fifty feet and a two-year guarantee is given with the cleaner.

The new "Vactric" cleaner and floor polisher

There is also a new three-brush electric floor polisher which will both wax and polish the floors. The finish is black and nickel and the brushes are interchangeable.

Equipment for Inhalation Treatment

"Pynazone" vapour is claimed to be a true reproduction in concentrated form of the curative atmosphere found at high altitudes adjacent to pine forests, and is a chemical combination of ozone and pinene. It is produced by the "Pynazone-Terpezone" generator which has been recently introduced, and is being made in this country by PINENE OZONIDE, LTD., 107, Charlotte Street, London, W.1.



The Pynazone-Terpezone generator

An induction motor-driven turbine pump draws air from outside the treatment room *via* a flexible metallic tube and passes it first through a chamber containing calcium chloride which extracts the moisture. The dry air is then divided, one stream passing over triple distilled pinene and the other through a special ozone tube having liquid electrolytes.

A potential discharge at between 10,000 and 12,000 V is effected between the inside of the outer chamber and the inner chamber without arcing, thus avoiding the production of harmful oxides of nitrogen. From a self-contained transformer the h.v. current is fed to the ozone tube by special electrodes. The two air streams, one as a vapour containing pure ozone and the other as a saturated vapour of pinene, unite in a mixing chamber and are further mixed in a glass sphere before issuing into the room. Except for the sphere and the air tube the whole of the apparatus is contained in a wooden cabinet 14 in. wide, 19 in. high, and 17 in. deep. The total loading is 70 W and a single plug or lamp-holder connector only is required. Both the motor and transformer are protected by means of cartridge fuses.

A Convenient Current Transformer

The "Easifix" current transformer is designed for fixing round a fuse to measure the load when no other part of the circuit is readily accessible. The transformer illustrated was made for use on Henley porcelain handled fuses, but transformers to suit other types of fuse handles can be supplied.

The core is laminated and the faces of the split core are treated to secure a good and constant magnetic circuit. One half of the core carries the secondary winding and the other the fixing and tensioning device. Four hooks on the latter engage with four corresponding pins riveted between extensions of the shrouding plates on the other half. The hooks are attached to a plate which can be moved slightly forward by tightening a single wing nut against a spring washer between the nut and the plate. This spring washer ensures a constant pressure on the core joint when the wing nut is loosened.

The "Easifix" current transformer, separate, and fixed to a fuse

The wing nut is first tightened; this moves the hooks forward and allows the bottom pair to engage with the pins when the two halves are pushed together round the fuse. A slight pressure between the two halves at the top causes the two top hooks, which are pivoted, to snap over the pins. It is now only necessary to loosen the wing nut so that the spring washer exerts a pressure on the core joints. In removing the transformer the operations are reversed except that the top hooks are disengaged by a slight pressure on the rod coupling their outer ends together. Both fixing and removal are very simple and can be carried out in a few seconds.

The limit of error at the rated burden of 5 VA is 5 per cent. in accordance with Class D. B.S.S. for Instrument Transformers. These transformers are suitable for use with all a.c. instruments, and are available from MESSRS. PRICE & BELSHAM, LTD., Tamworth Lane Works, Mitcham, Surrey, in standard ratios of 125/5, 150/5, 200/5, 250/5, and 300/5.

An Indoor Reflector for Discharge Lamps

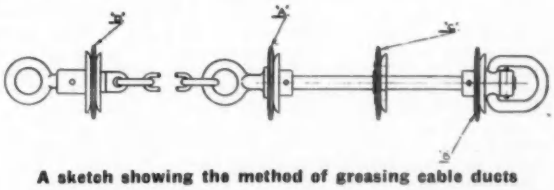
Messrs. VERITYS, LTD., Plume and Victoria Works, Aston, Birmingham, 6, have introduced a new type of reflector for electric-discharge lamps which can be taken down without removing the lamp. This "Maxlume" reflector is designed for indoor use only, and is suitable for "Mercra," "Osira," or "Sieray" lamps. The standard dispersive model is illustrated; another type directs the rays at an angle of 45 deg. for shop-window lighting. The equipment includes easy wiring tops, with porcelain goliath lampholders which are shockproof when the reflector is removed.

The "Maxlume" reflector for discharge lamps

Greasing Cable Ducts

The application of petroleum jelly or other lubricant to a cable as it enters the mouth of a duct into which it is being drawn results in an uneven distribution of the grease. The lubricant on the leading end tends to be scraped off in the duct so that drawing-in becomes heavy and the cable sheath is scored.

In view of the growing practice of drawing into ducts cables with an outer protective serving, BRITISH INSULATED CABLES, LTD., Prescot, have developed a method of greasing the duct instead of the cable. The device consists of an arrangement



A sketch showing the method of greasing cable ducts

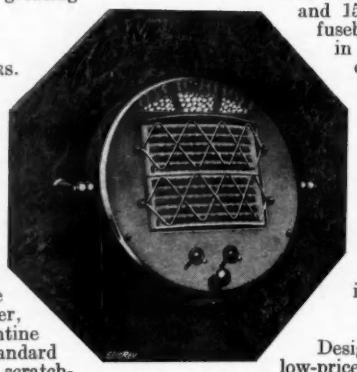
of flexible leather discs which are drawn through the duct ahead of the cable, the spaces between A and D and C and B being filled with grease, which is wiped on to the duct by the rear discs A and B. Disc C slides along the centre bar, and as it is forced backwards by the friction between it and the

duct wall it presses upon the grease behind it and feeds it to disc B, keeping this well supplied with lubricant. In a simpler arrangement C is omitted and B acts as second wiper and collector of surplus grease.

The usual precautions of pulling a plug and brush through the duct to remove grit and dirt before pre-greasing must be taken.

Adjustable Fires

The "Inclina" fire, made by MESSRS. BERKELEY & YOUNG, Tyseley, Birmingham, 11, has been designed for fixing to a wall in the ordinary way, but the actual element housing, which is the "Orb" type incorporating two 1-kW firebars, is fixed on two bracket arms, which permit angular adjustment of the heating surface; it is in this way that the unit differs from the lower-priced standard "Orb" separately mounted unit. The panel is octagonal in shape and can be attached to a wall by three Rawlplugs. Two separate switches are incorporated, and the fire is spun from copper, the finishes available being chromium, florentine bronze, and oxidised silver. As with the standard "Orb," the panel is claimed to be heat- and scratch-proof. It is made of asbestos slate surfaced with a veneer of bakelite fused to the panel on each side during the process of manufacture. The back of the fire is heat-insulated, and a deflector is incorporated to direct the heat from behind the firebars into the room; this deflector, together with the 1¼-in. projection, prevents discoloration of the surroundings.

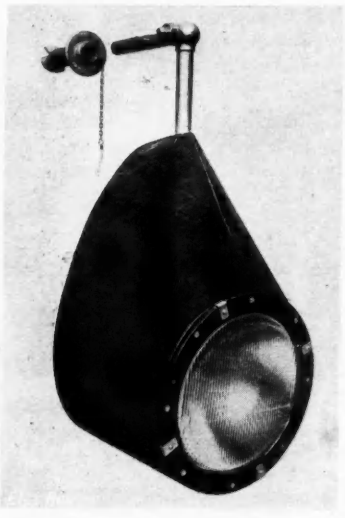


The B. & Y. Inclina Fire

During a test at the works a standard "Orb" fire was taken from stock and mounted on a wall with a sheet of ordinary corrugated paper between the fire and the surround. After the fire had been left on for thirty-six hours, there was no burning or discolouration of the paper, while the fire itself and surround were also undamaged.

Under-water Floodlighting

For installation in existing swimming baths, avoiding extensive structural alterations, BENJAMIN ELECTRIC, LTD., Brantwood Works, Tottenham, has introduced a new type of under-water floodlighting equipment. The new fitting is so designed that the provision of one small hole in the bath wall, above the water, to accommodate the supporting bracket is all that is required. Wiring is also simplified, the conduit being run under the coping to the necessary connecting plug point adjoining the bracket. Thus all necessary work can be carried out with the water still in the bath, and the unit can be detached when not required.



The Benjamin under-water unit

Injury to bathers is precluded by the special design of the containers which have no projections or sharp corners. The unit is intended for use with a 500 W Class "B" floodlamp, and has a special spreading front glass. It is only necessary to connect the two flexible projecting "tails" to a suitable watertight plug point adjoining the supporting bracket.

Owing to the wide lateral spread of light the units can be spaced 30 or 40 ft. apart.

Portable Amplifying Equipment

A complete low-priced portable sound amplifying equipment has been brought to our notice by the MARCONIPHONE CO., LTD., 210, Tottenham Court Road, London, W.1. It consists of a battery-driven microphone and power amplifier with anode and filament batteries assembled in a wooden carrying case. A combined switch and volume control is provided, and also a permanent-magnet moving-coil loudspeaker with a short directional flare built in the form of a portable cabinet; the moving-coil impedance is 8 megohms. The crystal microphone has a chromium-plated floor stand.

Improved Switch and Fuse Gear

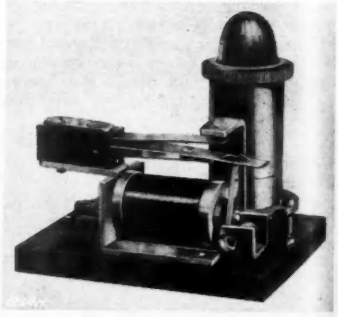
Several developments of interest have recently been announced in the "Keyway" switches and fuses made by HENDERSON'S, Electric House, Queen's Road, Brighton. There are now available 15A switch fuses and splitters with top and bottom bonding clamps for lead-covered cables and interlocked splitters with a d.p. switch (15 to 60A), while for domestic work 40 and 75A double- and triple-pole switch fuses are being introduced on the lines of the existing 20, 30, 60, and 100A switches. Heavy-duty double- and triple-pole switches and switch-fuses are now made with ratings of 120 and 150A. Newcomers to the range of ironclad fuseboards are 40, 75, and 150A sizes, available in all the usual forms. Cooker and washboiler control panels consisting of a standard cooker control unit with an auxiliary 5A switch and a 3-pin plug and socket have a change-over main switch, so that supply authorities with a flat-rate tariff can connect the cooker and wash-boiler to one main, and then only one can be used at a time. The main switch is rated at 30 to 40A, and both semaphore and lamp indicator models are marketed. The internal semaphore type of indication is also incorporated in the standard cooker units, which have been improved in design.

A Pastry Oven

Designed to meet the demand for an efficient, low-priced, pastry cooking unit, an oven recently placed on the market by the GENERAL ELECTRIC CO., LTD., Kingsway, London, W.C.2, is particularly suitable for use in shops or small tea-rooms which specialise in "home-made" confections. It is constructed of sheet metal and angle iron with a single-piece cast-iron front. The heating elements are totally enclosed and fitted for top and bottom heat, each independently controlled by a three-heat rotary switch.

Silent Cut-off Relays

The "Sterdy" cut-off relay is claimed to operate as silently with a.c. as with d.c. When the push-button is operated the full current passes through a coil operating an armature which, in turn, closes the contacts between the push-button and the bell, forming a complete circuit through the bell and automatically cutting off the current from the coil. In actual practice the change-over from the coil to the bell is almost instantaneous, and there is no chatter, vibration or hum. Owing to the shortness of the time during which the current passes through the coil there is no danger of its burning out. Arrangements can be made for either mechanical or electrical resetting. The makers are MESSRS. W. C. DAVEY & Co., 176, Tottenham Court Road, London, W.1, for ratings up to 250 V, 50 A.



The "Sterdy" relay

An Improved Car Battery

Coincident with the opening of the extension to their factory the YOUNG ACCUMULATOR CO. (1929), LTD., Kingston By-pass, New Maldon, announced the introduction of a new "super-armoured" accumulator for car starting and lighting. The positive plate is first enclosed between two thin films of glass silk, and the whole is encased in an envelope of "Porbonite" formed by sealing the edges of the "Porbonite" separators with soft rubber which, on vulcanising, becomes integral with the "Porbonite." The purpose of so protecting the electrodes is to prevent the peroxide from floating in the electrolyte and, settling on the negative electrodes; local action troubles are thus eliminated.

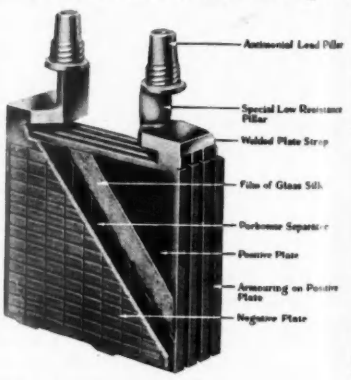


Plate construction of "super-armoured" battery

The disruptive action of the gas liberated in the charging and discharging of a battery is overcome by the glass silk breaking up the bubbles as they are formed, and the porosity of the "Porbonite" separator allows free passage of the electrolyte and gas reaction. "Porbonite" is manufactured at the works by the company's special process from pure rubber, and the separators are of exceptional and uniform porosity and impervious to the sulphuric acid and the products of electrolytic action. The fact that the cellular interstices do not present a straight path through the pores prevents clogging.

The Work of the Central Board

THE seventh annual report of the Central Electricity Board, covering the year ended December 31st, 1934, was published on Wednesday (Whitehead Morris, Ltd., 1s.). It covers a period during which the increase in output of electricity in Great Britain was about 14 per cent., making the total increase for the past five years 50 per cent., as compared with 10 per cent. for the world as a whole.

The greater rate of growth in 1934 over 1933 is attributed to 12 per cent. higher industrial production and to increased penetration in the domestic field. New factories for the most part automatically became consumers, while the reorganisation of factories provided a favourable opportunity for the substitution of public supplies of electricity for private plants.

Many authorised undertakings have sought the assistance of the Board's staff in the negotiation of varied power supplies, and this co-operation has resulted in contracts for supplies of nearly 800 million kWh per annum. The electrical industry, inclusive of electricity supply, wiring and contracting, now employs about 400,000 workers compared with 215,000 in 1921.

Growth of demand has necessitated the provision of further new points of supply on the grid system; part of the Colchester secondary ring and one new 132-kV transformer station in Surrey were put into commission. The 132/11-kV transformer bank at Wooler on the Dunston-Galashiels line, incorporating the new design of oil-blast fuses, is now in satisfactory operation. Additional facilities for giving railway supplies are being provided at Northfleet, Tunbridge Wells, Eastbourne and Hastings.

Selected Stations

The number of existing selected stations was increased to 129 by the inclusion of seven stations in the South-West England and South Wales area. The grid scheme also provides for the construction of thirteen new stations when required. It is anticipated that the first section of the new Fulham station, containing 120,000 kW of plant, will be ready for operation at the end of this year, and of the Tir John North station (Swansea) containing 60,000 kW during the coming summer. The 105,000-kW turbo-alternator at Battersea was being erected last year, and two stations of the Galloway Water Power Co. at Tongland and Glenlee are also nearing completion; the three remaining stations will be ready to run in 1936. The 30,000-kW set at Brighton was the only extension of a selected station to be brought into operation last year.

The Board issued directions for the extension of twenty-two selected stations by the addition of fourteen turbo-alternators aggregating 535,000 kW and boilers with an evaporative capacity of 8,275,000 lb. per ton, details of which are given in an appendix.

In the control rooms the introduction of continuous remote load indicators has assisted operation. Over 6,200 circuit miles (more than 80 per cent. underground) of private telephone lines are now rented from the Post Office.

The North-East Coast Standardisation

Standardisation of frequency on the North-East Coast has been expedited by the bringing of the Dunston 50-cycle station into commission, and over 50 per cent. of the change-over work has been completed. The other two principal areas in which change-overs are proceeding are those of the S.W. & S. Co. and the South Wales Distribution Co.

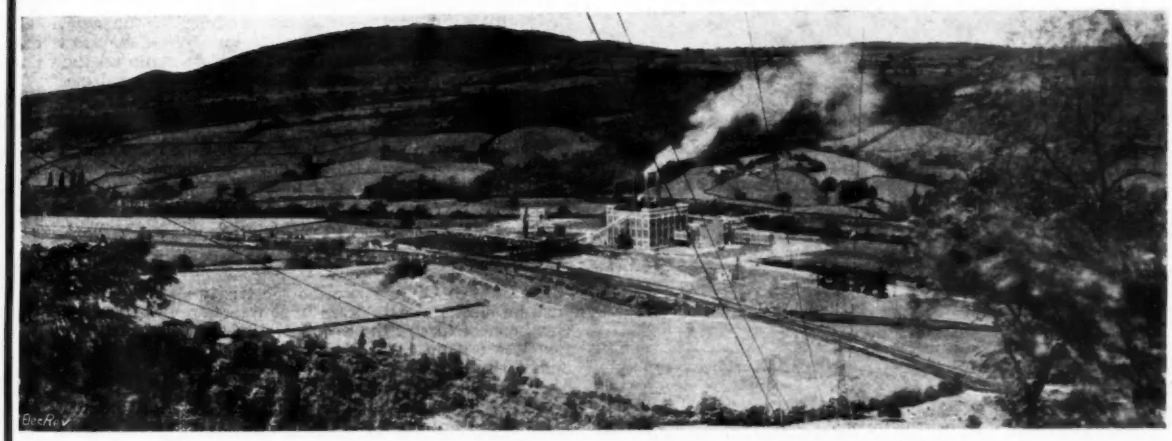
The development of anti-fog insulators, as the outcome of researches carried out by the Board, has resulted in the absence during the winter of flash-overs on any of the reinsulated sections. Investigations are in hand, in conjunction with the Electrical Research Association, with a view to determining the surge voltage distribution in transformer windings, the nature and magnitude of the voltage surges on transmission lines in service (by klydonographs and cathode-ray oscillographs), and the characteristics and relative merits of devices for protecting plant against surges.

A brief explanation is given of the grid breakdown of July 29th, when two major stations were put out of action simultaneously (for which the Sunday disposition of the generating plant had not allowed). It is stated that under the present arrangements there need be no apprehension of any such general dislocation in future. Reference is made to the numerous cases in which dislocation of supply has been avoided by assistance from the grid, coupled with the claim that the grid has raised the general level of reliability.

Estimated Savings

General trading had been begun at January 1st this year in all areas except South Scotland (awaiting the completion of the hydro-electric stations) and N.E. England (held up by frequency standardisation). Two appendices give details of the tariffs in force in the regional areas. The statutory provisions governing the relations between the owners of selected stations and the grid under the 1926 Act and the sections of the 1935 Act are summarised.

It is estimated that the saving in capital expenditure on generating plant due to the grid has exceeded £9,000,000, but extensions to selected stations are now commensurate with the annual growth of demand. The average fuel consumption at the selected stations interconnected in 1934 was 7 per cent. less than in 1932 under independent operation, representing a saving of £500,000 in operating costs.



A selected station—the Ironbridge undertaking of the West Midlands Joint Electricity Authority

The maximum amount which the Board is empowered to borrow is £60 million and the total amount borrowed at December 31st was a little over £47 million. The capital expenditure at that date on general purposes, after the deduction of a credit balance of £2,390 on account of purchase and sale of energy preliminary to general trading, was £32 million, while the capital expended on frequency standardisation stood at £14 million.

Financial Results

There was a credit balance on revenue account—general purposes of £86,102. This account covers approximately £18 million received from sale of energy, £17½ million as cost of energy, £479,000 transmission expenses (including £194,000 as cost of energy used in transmission), £55,000 for local rates, £240,000 as a proportion of management and general expenses, and £9,800 for redemption fund instalments and interest for expenditure to December 31st, 1928.

The report states that the credit balance would have been higher but for the mild weather in December, which reacted seriously upon the maximum demands made by undertakings on the grid, the demands for that month governing the kilowatt charges for the year under the Board's tariffs.

Interest payments attributable to the capital expenditure have been made out of capital and the relative sinking fund charges mainly suspended. The Board has not applied to the Treasury for a guarantee in respect of any of the stocks issued. Grants have been received from the Ministry of Labour towards the interest on money borrowed for standardisation of frequency in North-East England and for the purposes of the grid in that area and in South Scotland.

Business and Industrial Notes

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures

Cheaper Lamps

The Electric Lamp Manufacturers' Association informs us that, in order to meet the requirements of that section of the community to whom first cost is the dominant factor as distinct from actual lighting economy, its members will place on the market on June 1st 40 and 60-W pearl lamps at 1s. each and 100-W pearl lamps at 1s. 6d. each. These lamps, which will be known as "Type B." lamps, will have filaments of the simple coil type and the members of the E.L.M.A. do not intend them to take the place of the latest standard E.L.M.A. lamps which are of the coiled-coil type and are considerably more efficient.

A Travelling Showroom

Electricity has reached the villages, but the villages have no large showrooms where the housewife can see cooking demonstrations and a wide choice of appliances. A travelling showroom, one of the first of its kind in the West Riding,

The new demonstration van of the Electrical Distribution of Yorkshire, Ltd. The three gentlemen are Messrs. J. J. H. Stansfield (secretary), R. W. Wickham (chairman), and Mr. W. B. Woodhouse (managing director)

which generates its own electricity and carries a full range of electrical appliances, has now been fitted up to the requirements of Electrical Distribution of Yorkshire, Ltd., and will be used in the West Riding, in North Lincolnshire and in Cumberland, where the company's development programme has taken electricity to large populations. The van will stop anywhere required, and its slogan "Now for Electricity" will carry the benefits of electricity to all places where a supply has been taken.

Electricity in a Country Home

The cottage shown in the accompanying illustration is situated in the heart of the West Country. At one time an inn, and another a shoeing forge, it is to-day the week-end dwelling of Sir Ernest W. Petter. The interior has been brought up to date to suit the convenience and comforts of its occupants. Illumination is by electricity generated by a self-contained set manufactured by Messrs. Petters, Ltd., Yeovil, of which Sir Ernest is chairman. The installation consists of a small petrol engine, to which is rigidly attached a dynamo driven by a multiple belt, with the switchboard mounted on the dynamo. Air cooling is provided for the engine, and the absence of a water jacket eliminates the danger common to water-cooled engines of injury to the machine through failure to replenish water, or from frost in winter. The dynamo is shunt wound for battery charging, with series turns for motor starting, is fan ventilated, and has an output of 12 A at 50 to 70 V. The switchgear is totally enclosed and is provided with a starting switch, so that the set is started by pressing a button, automatic cut-in and cut-out, shunt regulator, voltmeter, voltmeter switch, charge and discharge ammeter, and two fuses. For hand starting in emergency a small strap is provided which is wound round the pulley; a brisk pull on the strap gives the engine a high rotative speed ensuring an easy and positive start. The wiring of the house was carried out by Mr. F. H. Merritt, A.M.I.E.E., Yeovil. In addition to the electrical installation there is a small Petter oil engine and pump which supplies water to the house and to two large tanks at the top of the garden used for ground watering purposes.

The country home of Sir Ernest Petter for which electricity is supplied by a Petter generating set

Sales Management Conference

The Electricity Supply Sales Management Conference, organised by the Electrical Development Association, which was held at Brettenham House, Lancaster Place, W.C.1, from March 25th to 27th, proved to be even more successful than the similar conferences of previous years. The total attendance was over 100, most of the delegates occupying managerial positions. The papers which were read and discussed covered many aspects of commercial development. On Monday following an opening address by Mr. A. C. Cramb papers were read on "The Basis and Methods of Electric Supply Advertising in a Large Town," by Mr. G. A. Proctor, and on "Local Advertising for Medium and Small Undertakings," by Mr. W. J. Bache. On Tuesday there were three papers, namely, "The Design, Staffing and Operation of Showrooms in a Large Town, Dealing in Particular With the Case of the Central Showroom," by Mr. D. Bellamy; "The Design, Staffing and Operation of Showrooms in a Large Town, Dealing in Particular with the Case of Multiple Showrooms," by Mr. E. J. Jennings; and "Sales Policy in the Development of a Rural Area," by Mr. L. Howles. On Wednesday Mr. V. W. Dale submitted a paper on "Recent Practice in the Organisation of Electrical Exhibitions, Electrical Stands at General Exhibitions, and References to Modern Design in Stand-fitting." It was generally agreed by those attending the conference that the standard of the papers and subsequent discussions was higher than ever before, and there is no doubt that everyone who took part gained much useful information and many new ideas. Among the most important lessons drawn from the conference were the necessity for adopting the E.D.A. recommendation that at least 1 per cent. of the total revenue of an undertaking should be allocated to publicity, that the organisation and training of the showroom staff were probably of greater importance than the showroom building; and that local electrical exhibitions run on the right lines were of great value in promoting more rapid electrical development.

French Lamp Litigation

The Compagnie des Lamps, of Paris, which controls a number of important incandescent lamp patents, recently brought an action against a number of French importers of Japanese lamps for infringements of its patents. The verdict of the Court was in favour of the plaintiffs, who were awarded damages.

Local Exhibitions

The Colwyn Bay Corporation Electricity Department recently held an electrical exhibition in conjunction with the local electrical contractors at the Sports Hall, Colwyn Bay. The exhibition was organised principally for publicity rather than sales, and the cookery demonstrations aroused considerable interest. The E.D.A. talking films also attracted large audiences, while lecture-demonstrations by the Lighting Service Bureau were a popular feature. The Department has reduced its electricity tariffs, particulars of which appear in our "Electricity Supply" section.

The West Hartlepool Corporation Electricity Department is holding an electrical exhibition during the current week at the Masonic Hall, West Hartlepool. In addition to a comprehensive display of domestic electrical appliances there are a model

dining room, bedroom and bathroom which have been fitted with electrical appliances demonstrating the home comforts that can be obtained by the use of these appliances. Each day the E.D.A. talking films are being shown. Among the electrical companies who are supporting the exhibition are Messrs. Falk, Stadelmann & Co., Ltd.; Berry's Electric, Ltd.; the General Electric Co., Ltd.; L. G. Hawkins & Co.; Herbert Bros.; Jobson and Son, Ltd.; A. Jones & Co.; Moffat's, Ltd.; E. Phillips, Ltd.; J. Pounder, Ltd.; A. Reyrolle & Co., Ltd.; M. Robinson & Son; Singer Sewing Machine Co., Ltd.; the Simplex Electric Co.; and the Sun Electrical Co., Ltd.

In Liverpool's first Brighter Homes Exhibition, which will remain open until April 13th, there are about eighty stand-holders. Electrical appliances are given a fair amount of prominence and one of the principal exhibits is that of the Liverpool Electric Supply Department, which has a big stand displaying every type of apparatus distributed from the municipal electricity showrooms. Electrical goods are also displayed by the British Vacuum Cleaner & Engineering Co., Ltd., Hoover, Ltd., Synchromatic Time Recording Co., Ltd., and Wilkins and Mitchell.

Dutch Electrical Imports and Exports

From the Dutch trade returns for last year just to hand we have compiled the appended tables showing the external electrical trade of Holland during 1934 as compared with the preceding year. It will be seen that both imports and exports advanced during the year. For purposes of comparison the Dutch guilders have been converted at the rate of 7.5 to the £.

	Imports.		Exports.	
	1933.	1934.	1933	1934.
	£	£	£	£
Electric generators and parts ...	305,600	167,335	47,600	22,535
Electric motors weighing under 11 lbs.	12,800	7,220	6,800	2,665
Electric motors weighing over 11 lbs.	138,135	119,335	88,935	109,067
Parts of motors	44,935	44,665	7,866	19,735
Radio apparatus and parts ...	920,000	1,402,665	5,282,665	5,960,400
Telegraph and telephone apparatus and parts	527,335	538,166	19,465	19,600
Electric vacuum cleaners... ...	336,400	251,466	11,200	2,535
Incandescent lamps	78,665	69,865	1,135,865	891,600
Arc lamps	2,535	4,265	9,734	13,465
Insulated wire and cables ...	407,467	362,267	236,665	119,335
Bulbs for electric lamps	8,265	9,600	110,000	114,665
Electric locos and vehicles ...	10,665	8,265	535	400
Other electric apparatus	940,135	910,266	251,665	381,665
Totals	£3,732,937	£3,895,360	£7,208,995	£7,737,667

As regards imports, Germany with £42,400, Sweden with £33,865, and the United States with £20,265 have displaced Great Britain from the first position, this country being only credited with £19,465 for 1934, Switzerland coming next with £15,735 and Belgium £7,335.

Reference to the statistics of exports shows an upward tendency, particularly as regards radio material, electric lamps and insulated wires and cables. The official returns are not so informative on the export side as they are as regards imports. Germany, Switzerland, and the Dutch East Indies, are at present the largest buyers of Dutch electrical machinery; Belgium, the East Indies, and Great Britain are the principal markets for large electric motors, Italy takes the largest quantities of Dutch vacuum cleaners; and Great Britain, Belgium, and France, those of electric lamp bulbs.

Municipal Trading at Liverpool

Objections to the activities of the Liverpool Corporation electricity showrooms in offering for sale lamps and appliances to the detriment of private shopkeepers were voiced at the last meeting of the Merseyside Chamber of Trade. A resolution was adopted for the circumstances to be brought to the notice of members of the Liverpool City Council with a view to action being taken to safeguard the interests of retailers of electrical goods.

The neon installation at the Empress Building, Coventry, for which Ediswan cables were used

Orders Recently Booked

The Sturtevant Engineering Co., Ltd., has recently received orders for electrostatic precipitators from the Leicester, Nottingham and Leeds Electricity Departments. The precipitator for Leicester is to be used in conjunction with the boiler of an evaporation of 230,000 lb. of steam per hour, the contract for Nottingham consists of four precipitators, each working in conjunction with a powdered fuel fired boiler of 200,000 lb. per hour evaporation, and the Leeds precipitator is to work with a powdered fuel fired boiler of an evaporation of 230,000 lb. of steam per hour. These precipitators will be of the same type as those installed at the Brimsdown station of the North Metropolitan Power Station Co., Ltd., but a somewhat unusual departure has been made in the case of Nottingham in that the precipitators will be built on the roof of the power station.

A Royal Train

During his recent visit to Australia the Duke of Gloucester had placed at his disposal by the South Australian Railways the " Murray " car, which was built as an inspection car for the Commissioner of Railways. The car is 80 ft. in length, and consists of a lounge, three sleeping compartments, a bathroom, a kitchen, and a dining room. The electrical equipment includes radio, fans, and electric speedometer, while the lighting of the various compartments, excepting small ornamental brackets, and enamel iron units in the kitchen, is carried out by means of Holophane fittings, which include " Ripple-lite " units of various design, and Holophane residential units and reflectors. Our picture shows the lounge, in which Holophane " Ripple-lite " units are used with 60- and 40-W lamps on a 32-V system.

Holophane lighting fittings on the train used by the Duke of Gloucester during his recent Australian visit

E.D.A. Activities

We have received from the British Electrical Development Association an album (E.D.A. 1252, 5s.) containing reproductions of printing blocks which are available for local advertising. These number 148 and are classified according to subject, *e.g.*, water-heating and cooking. Christmas advertising is given separate attention.

Recent Ediswan Cable Installations

The neon signs recently installed on the Empress Building, Coventry, are among the largest in the Midlands. The installation is approximately 180 ft. long and the letters are 3 ft. high. The total consumption of the installation is approximately 6 kW. About 400 yds. of 6,000-V lead-covered neon h.p., and 1,000 yds. of l.p. Edison Swan cable were used. Another interesting neon installation in the same town is that at the Forum Cinema, for which 250 yds. of 6,000-V Edison Swan lead-covered neon cable were used. The signs were manufactured and installed by the Priory Electric Service, Coventry.

The new wing of the King George Hospital, Ilford, has been equipped with 350 lighting points, for which 10,500 yds. of C.M.A. 600 meg. Edison Swan cable was used. The installation was carried out by Messrs. G. W. Day & Co., Ltd., the architects being Messrs. Dawson, Son & Allardyce.

Grenada Customs Tariff Modifications

The Customs Duties (Amendment) Ordinance, 1934, which amends the Customs tariff relating to certain goods imported into Grenada, includes electric lighting and power machinery for industrial purposes, on which the British preferential tariff is reduced from 15 to 10 per cent. *ad valorem*, and the general tariff from 22½ to 15 per cent. *ad valorem*.

Prices of Materials

Messrs. Henry Gardner & Co., Ltd., report, April 3rd: Copper bars (best selected), sheet and rod, £60, £2 inc. English pig lead, £13 15s., 10s. dec.

Messrs. Frederick Smith & Co. report, April 3rd: Electrolytic copper bars, £34 10s., £2 5s. inc. Ditto, ditto, wire rods, £38 15s, £2 5s. inc. Ditto, ditto, h.c. wire, 6$\frac{7}{16}$d., $\frac{7}{16}$d. inc. Silicium bronze wire, 7½d., $\frac{7}{16}$d. inc.

Messrs. Edward Till & Co. report, April 3rd: No change in the price of India rubber, Para fine.

The " Met-Vick " Calendar

The subject chosen by the Metropolitan-Vickers Electrical Co., Ltd., for its new calendar for the year ending March, 1936, is Miss Elizabeth Allen, a well-known film actress. This is the twenty-first of the company's "girl" calendars, and this attractive lady is a worthy successor to the charming girls of preceding years.

The new " Met-Vick " calendar

A Lamp Price Indicator

The General Electric Co., Ltd., has issued a new "Osram" automobile lamp price indicator for 1935. This indicator is on similar lines to those previously issued, but has been brought up to date so far as all the company's automobile lamps are concerned. The indicator is in the form of a revolving disc, by which the price of a lamp for a British, American, or other car can be instantaneously ascertained.

The company has also produced a striking new counter and window display card, advertising "Osram" automobile lamps. This illustrates two automobile bulbs arranged so as to give the impression of an owl, and beneath the picture is the advice "Drive wisely and see at night by using Osram automobile bulbs."

Trade Announcements

Messrs. A. Arnold & Co. have removed to larger premises at 19, Clerkenwell Road, E.C.1. The telephone number remains unchanged.

Messrs. Ferguson, Pailin, Ltd., have opened a Midland office at Quality House, 25, Temple Row, Birmingham (telephone: Central 5431—telegrams: "Switchgear Birmingham"). The office will be in the charge of Mr. J. Blount, B.Sc.

Messrs. G. W. Franklin & Son, registered electrical contractors, have opened offices at 11, Fitzroy Square, W.1 (telephone: Museum 3123). This will be the company's head office to which all correspondence should be addressed in future.

Social Events

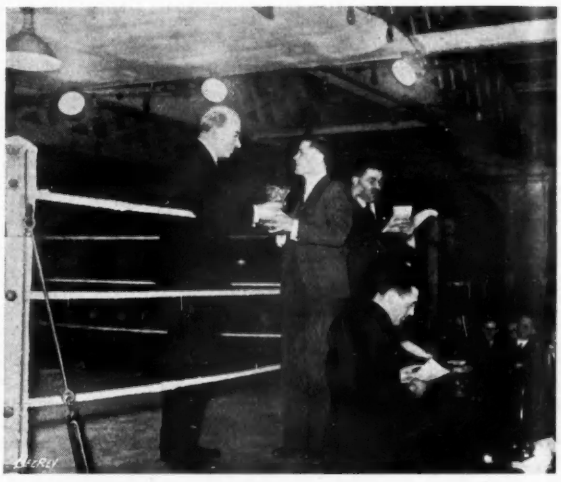
Mr. J. McKenzie won the Phillips challenge cup and replica at the competition of the Wallasey and Birkenhead Electrical Trades' Golfing Society at Heswall on March 28th. Mr. E. G. Pulford, jun., won the second prize in Class A, whilst the first and second prizes in Class B went to Messrs. J. L. Davies and R. McKenzie respectively.

The staff of the Holland House Electrical Co., Ltd., held a pleasant social evening on March 27th at Burlington House, Bath Street, Glasgow. The function took the form of a whist drive and dance. The programme was carried through under the direction of Mr. F. Dunnet, assisted by Miss H. Shields and Miss D. McInnes. Mr. H. Watson, chairman, welcomed the company, and there was present a good representation of all sections of the trade, and the company's various branches.

Since the beginning of the year the dramatic society associated with the London Electric Wire Co. and Smiths, Ltd., has been re-formed to include operatives at the works, and there has consequently been an influx of new talent. It was refreshing to see one or two newcomers in the cast of "Tilly of Bloomsbury," which the Society presented at the Guildhall School of Music Theatre, London, on Tuesday, and at the same time the more familiar players were, if anything, in better form than ever. The dry humour of "Mrs. Welwyn" was irresistible, while the more blatant comicalities of "Mr. Stillbottle" did not fail to raise a laugh. At the conclusion of the comedy the audience—there were few vacant seats in the theatre—loudly applauded the players and the producer (Mr. F. Lockett). Mr. E. Leete, the president, congratulated the society, and Mrs. Leete presented bouquets, being herself similarly honoured. The next production is fixed for November 13th.

On March 30th six members of the Kearsley power station staff of the Lancashire Electric Power Co. met a B.T.H. team at Badminton, after paying a visit to Willesden works, the result being a win for the B.T.H. after a series of well-fought games.

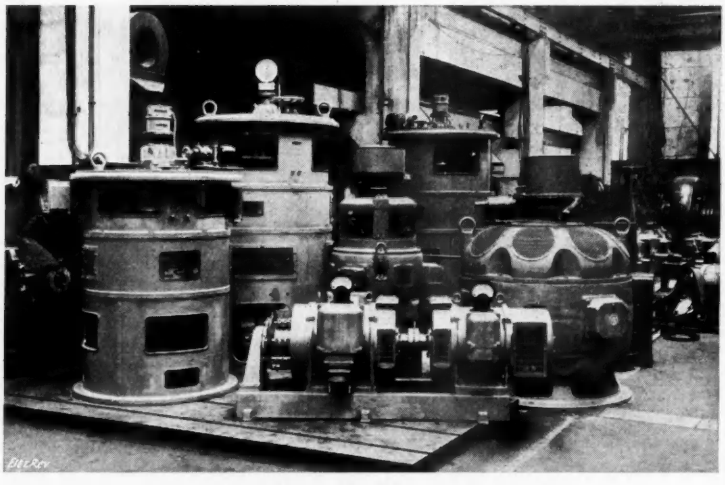
On March 29th the B.T.H. Willesden Boxing Club held a tournament with that of Callender's Cable & Construction Co. The visitors included Mr. J. L. Wilson (director, B.T.H. Co.), Mr. B. B. Sankey (I.G.E. Co.), and Messrs. Callender and W. G. Black (Callender's Cable Co.). The tournament was won by Callender's by three bouts to two. Our picture shows Mr. Wilson presenting the prizes to the successful competitors at the close of the proceedings.



Mr. J. L. Wilson presenting the prizes at a recent boxing tournament between the B.T.H. and Callender's clubs

Electric Motors for Pumping Service

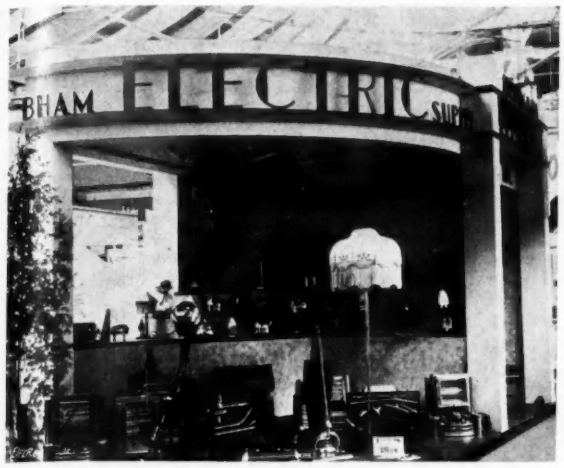
The British Thomson-Houston Co., Ltd., has in hand several important orders for electrical plant for waterworks, and the accompanying illustration shows a few examples of the various types of motors at present being manufactured at Rugby for this and similar services. The machine on the extreme left, together with the small horizontal regulator set in the foreground, form a variable speed shunt characteristic unity power factor equipment for bore-hole pumping service. The main motor is rated at 200/70 h.p., 850/620 r.p.m., and the movable brushgear provides the variable excitation voltage for the speed regulating machine, which is rated at 25 kVA, 1,500 r.p.m., and is driven by a slip-ring induction motor. The three machines in the centre of the group are variable speed shunt type a.c. commutator motors, each being one of two machines manufactured for three different installations. The motor on the left is for surface drainage and sewage pumping duty, and is continuously rated at 130/44 h.p., 600/420 r.p.m. The centre one is of the protected type, continuously rated at 39.5/6 h.p. (50 h.p. maximum), 880/535 r.p.m., and is for an installation in Australia. The machine on the right of these three is a drip-proof machine for bore-hole pumping, continuously rated at 200/132 h.p., 825/650 r.p.m. Each of the three machines is fitted with brush-shifting gear for speed variation, and an electrical tachometer. The machine on the extreme right is a slip-ring induction motor, one of five supplied for the same installation for driving circulating pumps. The motor is of the protected type and is rated at 290 h.p., 418 r.p.m.



A group of B.T.H. motors for pumping service

The National Trades Exhibition

At the annual National Trades Exhibition at Bingley Hall, Birmingham, the Corporation Electric Supply Department has an attractive stand which is devoted to a display of electric



The Birmingham Electric Supply Department's stand at the National Trades Exhibition

lighting, heating, water-heating, cooking and labour-saving domestic electrical appliances. The exhibition closes on April 27th.

Belgian Foreign Electrical Trade

The official returns of Belgium's electrical imports and exports during 1934 show that, as compared with 1933, there was a decrease in the imports, but a slight advance in the exports. The total value of the imports (Belgian francs at 125 to the £) amounted to £2,469,496, as compared with £2,869,344, a decrease of £399,848, or nearly 12 per cent. On the other hand, the exports advanced from £1,197,704 to £1,286,256, a rise of £88,552, or nearly 9 per cent.

	Imports.		Exports.	
	1933.	1934.	1933.	1934.
	£	£	£	£
Dynamo-electric machinery ...	379,088	330,440	162,888	197,472
Dry batteries	40,400	38,048	1,272	824
Accumulators and parts	19,240	22,160	22,816	17,832
Magnets (other than electro-magnets)...	5,112	3,288	8	344
Land and submarine cables ...	8,320	4,912	144,584	159,296
Insulated wires and cable... ...	56,944	69,920	200,160	180,920
Copper wire (not insulated) ...	1,256	1,520	5,928	3,816
Carbons and electrodes	35,408	35,728	1,184	296
Porcelain insulators	27,432	18,488	2,400	2,904
Electric globes, bulbs and glass ware	45,968	49,048	21,656	33,208
Insulating tubes, junction boxes, etc.	28,080	30,496	14,128	16,648
Other insulating material ...	35,880	26,808	2,704	4,464
Arc lamps	5,136	968	40	184
Incandescent lamps	210,760	135,624	84,360	88,672
Radio valves	134,416	232,456	*	2,856
Electric measuring instruments ...	135,568	138,372	5,800	7,432
Telegraph and telephone apparatus	40,152	19,968	329,688	355,048
Wireless transmitting and receiving apparatus	672,400	311,640	19,776	19,984
Wireless sets, not assembled ...	111,576	35,256	5,328	29,808
Wireless loud speakers, microphones, etc.	†	51,152	†	5056
Wireless parts	†	97,032	†	2,288
Other electrical apparatus ...	876,208	816,352	172,984	156,904
Totals	£2,869,344	£2,469,496	£1,197,704	£1,286,256

* Included with incandescent lamps.
† Included with Telegraph and telephone apparatus.

New Catalogues and Lists

Metropolitan-Vickers Electrical Co., Ltd., Trafford Park, Manchester.—Booklets No. S.P. 7102/12 and 13, giving brief descriptions of "Cosmos" lamps and fittings for decoration and floodlighting.

T.M.C.-Harwell (Sales), Ltd., Britannia House, 233, Shaftesbury Avenue, W.C.2.—An illustrated and priced folder of "Temco" striking and chiming clocks.

Clifford & Snell (Eng.), Ltd., 16, Queen Anne's Gate, S.W.1.—Two leaflets briefly describing "Loudaphones."

Elliott Bros. (London), Ltd., Century Works, Lewisham, S.E.13.—A leaflet giving particulars of Siemens ring balance meters for flow, draught and pressure of gases, etc.

David Brown & Sons (Hudd.), Ltd., Huddersfield.—An illustrated brochure fully describing "Taurus" bronze castings.

Zeros (Sales), Ltd., Dagenham, Essex.—Folder giving illustrated particulars of the "Zeros" refrigerators.

Edison Swan Electric Co., Ltd., 155, Charing Cross Road, W.C.2.—Brochure No. L.1021, describing lamps and fittings for Jubilee illuminations. Tastefully coloured.

Hedin, Ltd., St. Mary Street, Ladywood, Birmingham.—Catalogue giving particulars and prices of electric heating appliances for industrial and domestic use, and lists No. 9034-5 describing paper ageing and folding apparatus.

Tuscan Engineering Co., 68A, Colebrooke Row, N.1.—Leaflet on "Tuscan" rotary convertors for neon signs.

Igranic Electric Co., Ltd., 149, Queen Victoria Street, E.C.4.—Illustrated brochure describing the chain-link-operated air-break circuit-breaker.

Babcock & Wilcox, Ltd., Babcock House, Farringdon Street, E.C.—A well-produced booklet describing with excellent illustrations the company's special process equipment.

United Steel Companies, Ltd., 17, Westbourne Road, Sheffield.—A brochure prepared by its associated company, Samuel Fox & Co., Ltd., entitled "Some Notes on Alloy Steels."

Power Centre Co., Ltd., 11, Chaloner Street, Liverpool.—List No. 35, containing illustrated particulars of the company's patent turret trunking system.

English Electric Co., Ltd., Stafford.—A number of leaflets describing three-phase and single-phase capacitor motors for power factor correction, neon transformers, oil circuit-breaker, d.c. machines, a breakfast cooker, and the electrification of the Copenhagen suburban lines.

Brook Motors, Ltd., Empress Works, Huddersfield.—Folder tabulating approximate full load currents on 50 cycles of the company's a.c. motors and a leaflet drawing attention to its 4 h.p. single phase squirrel cage motor.

Winding-up Petitions

The Highfield Electrical Co., Ltd.—A petition for the winding-up of this company has been presented to the High Court by Mr. A. J. Salisbury, 1A, Grosvenor Gardens, S.W., and will be heard in London on April 8th.

British Lumophon, Ltd.—A petition for the winding-up of this company has been presented to the High Court by Marconi's Wireless Telegraph Co., Ltd., Standard Telephones & Cables, Ltd., and the Gramophone Co., Ltd., and will be heard in London on April 15th.

Bankruptcy Proceedings

J. L. Gottlieb, wireless maker, 28, Ranulf Road, Hampstead.—The statutory first meeting of creditors was held on Monday last at London Bankruptcy Buildings. The debtor estimated his liabilities at about £7,000 and the only assets were "bad book debts, £2,000 to £3,000." The debtor stated that after a previous failure in 1927 he became managing director of J. L. Gottlieb & Co., Ltd., whose business was acquired by another company and was eventually merged in Electrical & Radio Products (1931), Ltd., which went into compulsory liquidation in April, 1934. Since then he had acted as manager and secretary for another company. The failure was attributed to liability under guarantees. The case was left with the Official Receiver to be wound up under an order of adjudication.

D. F. B. Bate and **G. S. C. Bate** (lately trading as Bate Bros. at 165, Oxford Road, 192, Colne Road and 33, Manchester Road, Burnley), radio engineers.—Public examination May 13th at the County Court House, Bankhouse Street, Burnley.

D. J. Spire, electrical engineer, Market Place, Bourne.—Trustee, Mr. W. A. J. Osborne, 119, Finsbury Pavement, E.C., appointed March 21st.

H. T. Ballantyne, electrical engineer, 14, Waterloo Crescent, Bramley, Leeds.—Receiving order made March 23rd on debtor's own petition.

D. C. Hayes (Streetsbrook Electrical Co.), electrical contractor, 195, Bromsgrove Street, Birmingham.—Last day for receiving proofs for dividend April 13th. Trustee, Mr. C. Hoult, 159, Great Charles Street, Birmingham. Official Receiver.

H. C. Vanson, electrical engineer, 35, Pasture Road, Goole.—First and final dividend of 2s. 0¾d. in the £, payable March 29th, at 13, Burton Street, Wakefield.

L. L. Morgan, radio and electrical engineer, 7, High Street, Purley.—Receiving order made March 20th on a creditor's petition.

A. Davis, radio dealer, 64, Coborn Road, Bow, E.—Receiving order made March 26th on a creditor's petition. First meeting April 8th and public examination May 29th at Bankruptcy Buildings, Carey Street, W.C.

Company Liquidations

Scott Radio, Ltd.—Meeting April 6th at 25, Haymarket, S.W., to receive an account of the winding-up by the liquidator, Mr. H. C. Goodyer.

S. P. Catterson & Sons, Ltd.—Winding up voluntarily. Liquidator, Mr. H. D. Bell, 53, New Broad Street, E.C.

Wates Radio, Ltd.—Meetings May 1st at 78, New Oxford Street, W.C., to receive an account of the winding-up by the liquidator, Mr. C. Latham.

Italian Foreign Electrical Trade

The appended table shows the Italian imports and exports of electrical machinery and cognate apparatus during the past year as compared with 1933. The Italian lire values have been converted to sterling at 57½ to the £. It will be seen that the imports show an increase of £4,980 and the exports a falling-off of £72,095, or over 11 per cent.

	Imports.		Exports.	
	1933.	1934.	1933.	1934.
	Lire (Thous. omitted).		Lire (Thous. omitted).	
Accumulators and parts ...	768	471	1,229	790
Lamp bulbs	1,565	1,513	4	—
Electric measuring instruments	3,280	3,541	143	320
Radio apparatus	17,496	9,350	2,677	2,873
Telegraph and telephone apparatus	16,447	16,347	1,801	949
Miscellaneous electric apparatus	29,451	35,047	12,292	8,835
Electric furnace and other carbons	5,164	4,825	299	209
Insulated cables	316	353	1,537	2,309
Electricity meters	2,603	2,756	764	1,241
Insulated wire	884	942	2,982	3,075
Generators and motors, "without collectors"	7,451	8,702	862	683
Generators and motors, "with collectors"	10,064	11,877	13,216	13,227
Glass and porcelain insulators...	489	608	791	1,126
Arc lamps	39	65	13	8
Incandescent lamps	6,114	6,058	1,168	902
Static transformers	2,437	2,360	1,598	572
Insulating tubes	24	64	44	109
Total lire	104,592,000	104,879,000	41,420,000	37,228,000
Total at 57½ lire to the £ ...	£1,819,000	£1,823,980	£720,345	£647,440

Electricity Supply

Lighting, Domestic, Power

Abertridwr.—IMPROVEMENT WORKS.—The South Wales Power Co. has established a new transformer station at Graid-y-Fedw, and has renewed sections of the mains in order to improve the supply in Abertridwr.

Barnstaple.—REDUCED CHARGES.—The following reductions in charges have been approved by the Town Council and date from April 1st: Lighting, from 7½d. to 7d. per kWh; slot-meter supply, 8½d. to 8d.; public lighting (less discount), 4½d. to 3d.; two-rate system, 7½d. to 7d., 7d. to 6½d., and 4d. to 3½d.; power, first 500 kWh at 3d., next 500 at 2d.; heating and cooking, from 1½d. to 1d.

Birtley (Durham).—ELECTRIC-DISCHARGE LIGHTING.—A five-mile stretch of electric-discharge street lighting between Birtley and Chester-le-Street has been completed by the B.T.H. Co. and the North-Eastern Electric Supply Co., Ltd., for the County Council.

Bolton.—CHANGE-OVER.—The town centre is to be changed over from d.c. to a.c., and a new transformer has been delivered to the Electricity Department to step down the pressure from 6,500 V to 230 V.

Brighton.—WIRING FOR POWER.—The General Purposes Committee has decided that in all future cases where tenants hire cookers or wash-boilers it will pay the Electricity Department the weekly charge for wiring, up to a maximum of 3d. per week per house, the charge being understood to be calculated at the rate of 1d. per point.

Cam (Glos).—PUBLIC LIGHTING DECISION.—The annual parish meeting decided in favour of having street lighting installed.

Cheltenham.—STREET LIGHTING.—The borough electrical engineer is to proceed with a scheme for lighting roads on the Moors Estate at an estimated cost of £255.

OVERHEAD EXTENSIONS.—The Electricity Committee is to extend the overhead lines from Birdlip to Cowley at a cost of approximately £932.

SUB-STATION.—Tenders are being invited by the Electricity Committee for the erection of a sub-station in Gloucester Road.

Chertsey.—STREET LIGHTING.—As the contract with the Chertsey Gas Co. for the street lighting has expired the Urban District Council is to obtain an estimate for electric lighting from the Woking Electric Supply Co.

Chichester.—EXTENSION TO RUNCTON.—The City Council has applied for approval to a scheme for extending the supply of electricity to Runcton at an estimated cost of £1,495, the necessary guarantees having been received.

Colwyn Bay.—CHEAPER ELECTRICITY.—The borough electrical engineer and manager (Mr. J. V. Chaplin) has sent us a leaflet containing details of reduced charges operating from April 1st. The principal new tariffs are:—Within the borough: Lighting flat rate, 4½d. per kWh; lighting with a minimum consumption of 3,000 kWh per annum (2,000 kWh being between 8 p.m. and 4 p.m.), ordinary rate from 4 p.m. to 8 p.m., 3½d. per kWh for the first 500 kWh between 8 p.m. and 4 p.m. and 3d. for the next 500 kWh; "all-in" tariff for private users, fixed charge of 12½ per cent. on the first £100 of rateable value and 10 per cent. on the remainder, with 1d. per kWh for all energy consumed; domestic power, heating and cooking, 1d. per kWh; industrial power, &c., from 1¾d. to 1½d. per kWh; water heating (not during lighting hours), ¾d. per kWh; prepayment lighting, 5½d. per kWh. Rural areas: Lighting flat rate, 6d. per kWh; domestic power, &c., 1½d. per kWh; "all-in" tariff, 20 per cent. of the rateable value and 1½d. per kWh; and industrial power, 2d. per kWh.

Corby.—STREET LIGHTING.—The Kettering Urban District Council is to take over the street lighting from Messrs. Stewarts & Lloyds in September.

Cotherstone (Yorks).—NEGOTIATIONS.—The North-Eastern Electric Supply Co., Ltd., and the Parish Council are negotiating with regard to the district being supplied with electricity.

Edinburgh.—PROTECTING POWER PLANT.—Approximately £15,000 is to be spent by the Corporation in providing strainers to protect the plant at the Portobello station from the débris floating on the surface of the sea. Several times during the winter the turbine condensers became choked.

Finchley.—EXTENSIONS.—The Electricity Committee is to extend feeders and to erect a sub-station at Hampstead Garden Suburb at a cost of £12,000.

France. — MODERN STREET LIGHTING. — Ferro-concrete standards, each with a cluster of twin-filament lamps so wired that either full or half-wattage can be obtained, are used in a new system of street lighting at Nanterre. Altogether 1,300 standards have been provided along 60 miles of roadway. The supply is taken from a 3,000-V circuit, the pressure being transformed down to 110 V.

AN ELECTRIC TOWER WAGON.—The municipal authorities of St. Etienne have recently put into service an electric tower wagon for the cleaning of the 2,000 electric street-lighting lanterns centrally mounted on standards. By means of this wagon the cost of cleaning has been reduced to 40 per cent. of the former amount. The chassis is a 3-ton electric Sovel, on which is mounted an electrically operated tower with the platform rising to a height of 26 ft.

Glasgow.—LOWER TARIFF.—The charges for electricity are to be further reduced, the saving to consumers being estimated at £66,000 per annum. The reductions amount, in the case of the tariff for domestic consumers, to 10 per cent.; industrial power, 11.1 per cent.; commercial service tariff, 8.3 per cent.; and restricted hours rate, 10 per cent.

NEW PLANT.—The Electricity Committee has decided to install two additional 50,000-kW generators and six boilers at Dalmarnock power station at a cost of £1,000,000.

Glossop.—NEW CHARGES.—The Urban Electric Supply Co., Ltd., has reduced its charges. On the domestic and business rates all energy is to be charged at 1½d. per kWh. There are lower rates for power and lower meter rents, and the flat rates are now: Lighting, 7d.; heating and cooking, 1½d.; water heating, ¾d. per kWh.

Guildford.—MAINS EXTENSIONS.—The Electricity Committee is to extend mains to Hoe Lane, Peaslake, at an estimated cost of £1,625, and to houses at Goose Green, Gomshall, and Worplesdon. Extensions in the Stoughton area at an estimated cost of £1,860 are also recommended.

Gwyrfai.—DEVELOPMENT SCHEME.—The Rural District Council is negotiating with the North Wales Power Co., Ltd., with regard to a scheme for the electrical development of the district.

Herne Bay.—OVERHEAD LINE.—The Urban District Council has consented to the Herne Bay & District Electricity Supply Co., Ltd., erecting an overhead line from the Studd Hill estate to Swalecliffe.

LOWER CHARGES.—The company has reduced the standing charges on the all-in tariff for houses and combined shops and houses.

India.—THE PYKARA PROJECT.—The generating capacity of the Pykara plant is to be increased in two stages, namely, by extending the water-storage capacity and by installing additional plant. The necessity for providing additional water storage has now arisen. The scheme submitted by Major H. G. Howard, chief engineer for electricity, entails the construction of a dam across the River Mukurti at a site ten miles west of Ootacamund. The altitude of the river bed at the site of the dam is 6,795 ft. The reservoir will have an effective capacity of 1,600 million cu. ft. The total cost is estimated at Rs.2,125,000.

PALLIVASAL SCHEME.—A further Bombay message states that the Maharajah of Travancore has laid the foundation stone of a generating station in connection with the Pallivasal hydro-electric scheme. Two machines of 4,500 kW each will be installed, but provision has been made for increasing the capacity to 30,000 kW.

Ipswich.—MAINS EXTENSIONS.—The Electricity Committee recommends the extension of mains from Norwich Road to Henley Road at an estimated cost of £3,000.

Kettering.—DOMESTIC APPARATUS.—Provision is to be made for tenants on the Stamford Road estate to have the same facilities in relation to the installation of electrical apparatus as are afforded to the tenants of the Council's other estates.

Municipal Supply Undertakings' Results

Town.	Engineer.	Total Revenue.		Working Expenses.		Net Profit.		Sales of Electricity.		
								Thousands of kWh.		Percentage Increase.
		1933.	1934.	1933.	1934.	1933.	1934.	1933.	1934.	
		£	£	£	£	£	£			
Aberdare	W. E. Richardson ...	‡	41,216	‡	25,650	4,099	5,077	2,915	3,082	5.7
Abertillery	Dawson Thomas ...	13,013	14,554	9,847	9,860	1,736	3,036	632	768	21.5
Bedford	R. W. L. Phillips ...	162,916	167,475	99,693	125,805	3,351	5,049*	47,978	48,661	1.4
Harrogate	N. McLean	98,373	107,542	‡	59,383	14,196	17,920	12,975	14,547	12.1
Long Eaton	J. B. Feltham	36,480	38,702	25,410	25,478	1,130	2,239	4,464	5,242	17.4
Taunton	A. J. Howard	41,240	44,554	‡	25,937	1,903	5,952	5,202	5,932	14

* Net loss. ‡ Figures not available.

In cases where an electric boiler is installed, to replace a gas geyser or copper, the quarterly rental charge (4s. at present) will be charged to the Housing Repairs Fund.

Lancaster.—RURAL LIGHTING.—In response to requests from villages for public lighting facilities, electricity is to be offered at the same rate as at Caton, the installations being carried out at the Electricity Committee's expense, provided that satisfactory agreements can be reached with regard to the repayment of the capital sum involved.

The floodlighted training college

London.—FLOODLIGHTING A COLLEGE.—Twelve narrow-beam projectors (Kandem Electrical, Ltd.), with a total loading of 10 kW, are used to floodlight the front of the 200-ft. tower of the William Booth Memorial Training College, Denmark Hill, S.E. The two adjacent sides of the tower are relieved by means of similar projectors, with a total loading of 2 kW per side. The result is a very effective landmark on one of the highest positions in South London. The Surrey Engineering Co. carried out the engineering work in connection with the scheme, which is to be permanent.

BATTERSEA.—Arrangements are being made by the Electricity Committee to floodlight various municipal buildings at a cost of £300.

HACKNEY.—The Electricity Committee is seeking sanction to borrow £20,320 for extensions of transformer sub-stations required for the development of the a.c. supply scheme.

HAMMERSMITH.—The provision of new sub-stations and the extension of existing equipment at an estimated cost of £2,275 is recommended by the Electricity Committee.

L.C.C.—The laundry premises at the Hackney and Bow institutions are to be rewired by the L.C.C. at a cost of £600 and £380 respectively.

The Education Committee is to install electricity at Elm Court, Norwood; Lindon Lodge, Battersea; and Anerley School, Penge, at a cost of £2,070.

POPLAR.—Sanction has been obtained by the Electricity Committee to borrow £11,067 for services and £10,427 for wiring installations.

SOUTHWARK.—For the past two or three years it has been the practice of the Council to require a deposit to be paid by every new consumer. It has now been decided to dispense with deposits in the case of consumers on the "all-in" rate, and, with respect to ordinary consumers' deposits, to pay interest at the rate of 4 per cent. per annum.

MAINS AND SERVICES.—The Electricity Committee is seeking sanction to borrow £10,230 for mains and services.

WOOLWICH.—A sum of £10,000 is to be allocated to the relief of rates from the profits of the electricity undertaking. Mains extensions costing £6,578 are to be carried out.

Lynton and Lynmouth.—"ALL-IN" TARIFF.—The Lynton and Lynmouth Electric Light Co., Ltd., has introduced an "all-in" tariff for dwelling houses and shops, and the flat rate of 8d. per kWh for lighting will be subject to a rebate according to consumption (maximum rebate 2½d. per kWh).

North Wales.—RURAL SUPPLIES.—At a conference of representatives of local authorities and the North Wales Power Co., held last week at Shrewsbury to consider the supplying of electricity to rural areas, it was resolved to appoint a sub-committee to inquire into the position in each area. A report is to be presented to a future conference.

Oxford.—H.V. NETWORK EXTENSION.—Sanction is sought by the Electricity Committee to borrow £5,500 for cable and switchgear for the extension of the 11,000-V network.

These hydro-electric generators at Dnieprostroi exceeded the guaranteed performance

Russia.—AN EFFICIENT INSTALLATION.—As a result of tests conducted by Soviet engineers the General Electric Co., of

Preparing for the Jubilee

IN a previous issue we mentioned some of the plans for celebrating the Royal Jubilee at Liverpool; we are now informed by Mr. P. J. Robinson, the city electrical engineer, that in addition the South African memorial, Eros statue, Peter Pan and Jolly Roger are to be floodlighted, while the Sefton Park lake will be ringed with coloured strip lighting. The marble statue at Palm House is to be lighted, and a picturesque effect will be obtained by illuminating the inner bank of palms with floodlights erected in a vertical position from the gravel floor. The outer ring of plants and flowers and the statues surrounding the building are also to be floodlighted. Units will be attached to the underside of the Iron Bridge to illuminate the Dell, and two islands in the Walton Hall Park lake are to have strip lighting; this form of illumination, together with floodlighting, is to be used to decorate Stanley Park. No special regulations for temporary installations are to be drawn up.

Hampton Court Palace is to be floodlighted during the celebrations. In its report the Local Distribution Committee of the London and Home Counties Joint Electricity Authority stated that it had authorised the arrangements at an estimated cost of £250.

Pageantry with the aid of a comprehensive scheme of floodlighting is to be staged at Southampton. Traders in a main thoroughfare at Worthing are being asked to subscribe 2s. per ft. frontage towards the illumination and decoration of the street. Voluntary contributions from residents are being relied upon at Shoreham to make available a sum of £150 for illuminating public buildings and other celebrations.

Oldham Town Council is allocating £2,000 to the Jubliee arrangements whilst the Electricity Department is providing energy without charge for the exterior illumination of public buildings, shops and business premises in the area. A 2d. rate (£400) is to be devoted to the celebrations by Lichfield City Council. An elaborate scheme of illuminating the principal buildings is being undertaken at Taunton, where the equipment will also be used for the Bath and West Show.

Horsforth Urban District Council has arranged for the erection of thousands of "fairy" lights to outline the footpaths in Hall Park; in addition the spire of St. Margaret's Church, a noted landmark, will be floodlighted. For decorative lighting by private consumers electricity is to be supplied at ½d. per kWh by Lytham St. Annes Electricity Department, and no charge will be made at Lancaster. The following arrangements have been approved by West Bromwich Electricity Committee in connection with the Jubilee: The exterior of the town hall is to be electrically illuminated at a cost not exceeding £250; a display shall be arranged at the showrooms at a cost not exceeding £50; consumers desiring to decorate their premises are to be granted electricity gratis for this purpose.

Public buildings at Bristol which are to be floodlighted, include the University tower, the Cabot tower, cathedral, St. Mary Redcliffe, the Victoria Rooms, Royal Fort building, St. Nicholas Church spire, and St. Stephen's tower. Exeter city electrical engineer has been authorised to hire apparatus for floodlighting the cathedral, guildhall and war memorial at an approximate cost of £250.

Apart from treatment of public buildings a scheme of floodlighting the entire lake in Broomfield Park is being considered by Southgate Town Council. Sutton Coldfield Electricity Committee is undertaking jubilee floodlighting and illuminations at a cost of £500.

The Stalybridge, Hyde, Mossley and Dukinfield Tramways and Electricity Board has approved an expenditure of £400 for assisting the various constituent authorities with Jubilee celebrations. Arrangements made so far include the floodlighting of the town halls at Hyde, Dukinfield and Mossley, the Board's offices at Stalybridge, and four war memorials and the park entrance at Dukinfield. "Osira" coloured projectors will be used in the case of Hyde town hall, and multi-coloured lamps are to provide additional decoration at Dukinfield Park entrance. A special rate of 1d. per kWh will be operative during May for Jubilee illuminations (not advertisements). The Board's Hartshead power station will be open to the public for a period of ten days during the month.

Perth Corporation Lighting Committee is to consider a proposal to festoon the city's two bridges with coloured lights; it is stated 2,000 lamps will be required for the scheme.

New York, has earned a bonus on account of five G.E. hydro-electric generators installed at Dnieprostroi having exceeded the guaranteed efficiency. The tests were conducted under the direction of Professor P. Tolvinsky, of the Leningrad Polytechnic Institute, and one of the generators, given a complete efficiency test, showed that at full load (77,500 kVA) the efficiency was 97.91 per cent. The calculations for all five units showed an average full-load efficiency of 97.87 per cent.

The 77,500 kVA generators at Dnieprostroi are the largest of any type now in service. Each has a total weight of approximately eight tons, and the weight of the rotor and shaft is about 4½ tons. The maximum diameter of each generator is 42 ft.

Rawtenstall.—Commission for Contractors.—In cases where contractors introduce hire-purchase customers to the Electricity Department a commission of 5 per cent. is to be allowed.

Salford.—A Revised Tariff.—The Electricity Committee recommends that the following revised "all-in" rate for business premises be substituted for the rate at present in operation: A fixed annual charge at the rate of £12 per kW of lighting maximum demand for the first 5 kW demand, £9 for the next 5 kW, and £6 in excess of 10 kW, plus ¾d. per kWh metered for all electricity used for lighting and any other purpose.

Loan.—Sanction is being sought to borrow £29,300 for sub-station equipment.

Seaham Harbour.—Requests for a Supply.—The Urban District Council has been requested by eighty-eight residents to provide a supply of electricity, and has referred the applications, along with similar petitions from Dawdon, to Londonderry Collieries, Ltd.

Sheffield.—Extensions.—The Electricity Committee is to extend mains at a cost of £3,850.

Stalybridge.—Tariff Revision.—The Stalybridge, Hyde, Mossley and Dukinfield Tramways and Electricity Board has informed us of the following revised rateable-value tariff, which became operative on April 1st: Fixed charge, 15 per cent. of the rateable value per quarter; running charge, 1d. per kWh for the first 120 kWh per quarter, ½d. per kWh for the next 50 kWh per £ of rateable value, and ¼d. per kWh for all in excess of that amount.

Stoke-on-Trent.—£30,000 Loans.—The Electricity Committee is seeking sanction to borrow £15,000 for sub-station extensions and £15,000 for works in connection with the change-over.

Tynemouth.—Ring Main.—At a meeting of the Electricity Committee Mr. Charles Turnbull, electrical engineer, reported that owing to the continued growth in the output of electricity it was necessary that arrangements should be made for the construction of a ring main for the h.v. supplies. The Committee authorised construction of the main at an estimated cost of £1,150. A 6,000-V cable will accordingly be laid from Lovaine Place to Dock Road sub-station.

Loans.—Application is to be made for sanction to borrow £10,000 for mains and services. Sanction has been received to a loan of £3,000 for sub-station equipment.

Wallasey.—New Charges.—We are informed by Mr. B. T. Hawkins, borough electrical engineer and manager, that the following reductions in charges have been sanctioned and will operate as from the current quarter's meter reading:—Lighting, first 500 kWh per quarter reduced from 3½d. to 3¼d. per kWh and second 500 from 3¼d. to 3d.; lighting through prepayment meters, 4d. to 3¾d. per kWh; domestic tariff fixed charge reduced by approximately 20 per cent. and during the two summer quarters the kWh charge will be .33d. instead of .4d.; power, first 1,000 kWh per quarter reduced from 1½d. to 1¼d. per kWh, the second 1,000 from 1¼d. to 1d., and the third 1,000 from 1d. to ¾d.

Waskerley (Durham). — Waterworks Lighting. — The Durham County Water Board has installed generating plant at the Waskerley waterworks to provide electricity for lighting the buildings, filter beds and workmen's houses. The dynamo is driven by water from the mains.

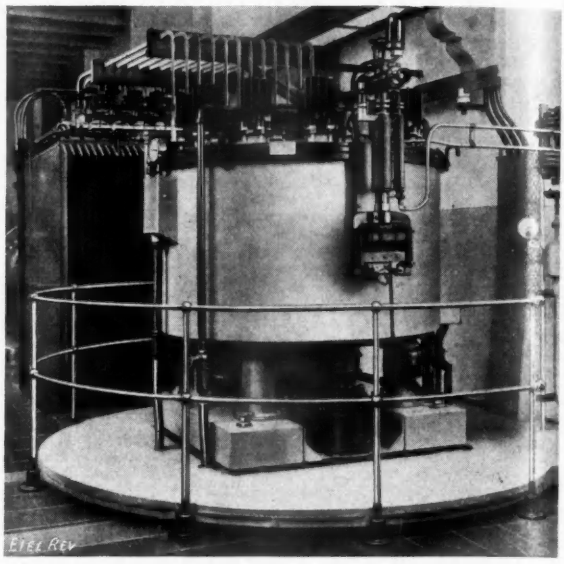
York.—Electrical Developments.—The City Council proposes to spend £61,550 on electrical developments during the next financial year.

Traction

Great Britain.—Trolley-buses and Radio.—The Ministry of Transport is taking action to reduce radio interference caused by trolley-buses, according to the *Daily Telegraph*. In future the Ministry's approval for new buses will not be given unless they are designed to eliminate interference as far as possible.

Italy.—A Tramway Rectifier.—The Compagnia Generale di Elettricita, Milan, has recently built for the Officine Elettriche Genevesi a 1,200 kW, 600 V mercury rectifier, which is said to be the first rectifier built in Italy for tramway service. The associated transformer was also built by the C.G.E., and the cooling installation has been given particular attention.

Railway Electrification.—During 1934 electric traction enabled the Italian railways to reduce their coal consumption by 659,000 tons. The electrified Udine-Tarvisio line is expected to be inaugurated in October next, while a new line is to be constructed between Pavia and Brescia, passing through Lodi, Crema, and Soncino. It will facilitate communication between Genoa and Venice and lighten traffic in and out of Milan. The line will be 95 km. long, with a double electric track, and the cost is estimated to be 800,000 lire per km.



The Italian tramway rectifier and transformer

Newcastle-upon-Tyne.—Railway Modernisation.—The scheme of the London & North-Eastern Railway Co. to modernise the electric railway service between Newcastle and the coast at an estimated cost of £400,000 is to be proceeded with, and it is understood that contracts will be placed shortly.

Roumania.—Future Electrification.—It is intended to commence the electrification of the heavily graded Campina-Brassov line of the Roumanian State Railways this year, but the decision as to whether 3,000 V d.c. or 15,000 V, 16.6 cycles, single-phase a.c. shall be used is to be deferred until the tenders have been considered. It is estimated that, without any increase in traffic, the conversion will effect an annual saving of 85,000,000 lei (£168,000) in the working expenditure. The cost of conversion is estimated at 500,000,000 lei (£1,050,000 at par).

Switzerland.—Electric Coaches.—It is announced from Berne that on May 15th the Swiss Federal Railways will place in service two electric motor coaches each equipped with two electric motors developing 350 h.p. and capable of travelling at 77 m.p.h. The weight of each coach is 32.5 tons, accommodation being for seventy sitting and thirty standing passengers. The driver controls the automatic operation of the doors and steps, and the issuing of tickets.

Communications

Africa.—Telegraph and Telephone Conference.—Arrangements are being made to hold a Pan-African Post, Telegraph, and Telephone Conference in Pretoria next September. Invitations have been issued to the Government authorities of the Belgian Congo, the French Congo, Kenya, Mozambique, Southern Rhodesia, Tanganyika, and Uganda.

Czechoslovakia. — Combating Interference. — A *Reuter* message from Prague states that a law has been drafted which provides that anyone installing electrical apparatus shall spend a sum not exceeding 5 per cent. of its cost on safeguarding against interference. If, however, the cost of the protective installation is more than a specified amount it is to be borne partly by the installer of the apparatus and partly by those radio listeners who will benefit.

France.—New Radio Stations.—Three new French wireless stations will be opened at the end of April. They are Muret-Toulouse (120 kW), Lyons (90 kW), and Lille (60 kW).—*Reuter* (Paris).

Telephone Campaign.—The *Daily Telegraph* states that the Postmaster-General, M. Mandel, in an effort to increase the use of the telephone, has offered a bonus of 15s. to employés who secure new subscribers. M. Mandel says that there are only 1,300,000 telephone subscribers in France, compared with 17,426,000 in the United States, 2,960,000 in Germany, and 2,109,000 in England. The percentages for population are: United States, 13.94; England, 4.6; Germany, 4.5; France, 3.

Germany.—Television.—The first regular high-definition television programme service was inaugurated recently. Regular television broadcasts are taking place every Monday, Wednesday, and Saturday, from 8.30 p.m. to 10 p.m. (Central European time). Vision is broadcast on 6,772 metres and sound on 7,059 metres. A further twenty-five ultra-short-wave transmitters will be provided later.

Great Britain.—Television.—A sum of £50,000 for television is included in the amount set aside for the British Broadcasting Corporation in the 1935-36 Estimates of Revenue Departments.

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Aberdeen.—Education Committee. Various works, including electrical and heating, at reconstruction and enlargement of Skene Square school. Specifications, &c., from J. A. O. Allan, 25, Union Terrace; tenders to town clerk.

Argentina.—BUENOS AIRES.—April 25th. State Railways Administration. 20,379 electric lamps. (A.Y. 12984.)*
April 30th. Three electric goods trolleys. (G.Y. 14972.)*

Australia.—MELBOURNE.—Posts and Telegraphs Department. May 14th. V.i.r. l.c. cable. (A.Y. 12965.)*
May 28th. Telephone switchboards. (A.Y. 12985.)*
SYDNEY.—Municipal Council. May 20th. On-load tap changing equipment for two transformers. (A.Y. 12991.)*
City Council. May 8th. Ring main switchgear. (A.Y. 12976.)*

Bedford.—April 24th. Public Assistance Committee. Electric lighting at the Biggleswade Institution. Specifications from the County surveyor, Shire Hall; tenders to the clerk of the County Council.

Blackpool.—April 23rd. Electricity Department. 1,750-kW motor convertor. (March 29th.)

Brighton.—April 6th. Waterworks Department. Electric lighting at Goldstone pumping station, four cottages and one house. Specifications, &c., from the waterworks engineer, 12, Bond Street; tenders to the town clerk.

Bristol.—April 10th. Electricity Department. E.h.p. switchgear, l.p. switchgear, 6.6 kV and 11 kV transformers. (March 29th.)

Bromley.—April 15th. Electricity Department. Single- and three-phase static transformers. (See this issue.)

Cardiff.—April 18th. Electricity Department. Three-phase transformers, and fire protection apparatus. (See this issue.)

Coventry.—April 18th. Education Authority. Machinery, tools, apparatus and equipment for new Technical College. (March 22nd.)
April 15th. Electricity Committee. Demolition of two steel cooling towers. (March 29th.)

Ealing.—April 5th. Electricity Department. L.p. cable. (March 29th.)

Erith.—April 10th. U.D.C. Electric lamps during twelve months ending March 31st, 1936. (March 29th.)

Farnworth.—April 15th. Electricity Department. L.p. cables. (See this issue.)

Glasgow.—April 13th. Lighting Department. Steel lighting poles and aerial cable. Specifications, &c., from the Inspector of Lighting, 20, Trongate; tenders to town clerk.

Halifax.—April 8th. Housing Committee. Various works, including electrical, at houses on the Pye West (ninety-eight) and the Ling Bob (twenty-eight) housing schemes. Specifications, &c., from the borough engineer, Crossley Street (deposit £2 2s.); tenders to the town clerk.
April 13th. Education Committee. Electrical work at Ovenden Senior school. Particulars from the borough engineer (deposit £2 2s.).

Hove.—April 15th. Corporation. Electric lighting and heating at the sanatorium, Upper Portslade. Specifications &c., from N. E. Chadwick, Public Health Office, Town Hall Annexe, Third Avenue; tenders to the town clerk.

Hull.—April 16th. Electricity Department. Electric mobile crane. Heating installation at Dagger Lane depôt, and metal tank type rectifier. (See this issue.)

Ilford.—April 18th. Electricity Department. Four 500-kVA transformers and one electric van. (See this issue.)

India.—SIMLA.—Indian Stores Department. May 9th. Four single operator d.c. arc welding sets. (A.Y. 12992.)*

Irish Free State.—DUBLIN.—May 6th. Electricity Supply Board. Boiler plant and auxiliaries. (See this issue.)

King's Lynn.—April 6th. Electricity Department. Supply and laying of 11,000-V cable. (March 22nd.)

Leeds.—April 10th. Transport Committee. 6,600-V switchgear for a traction sub-station. (March 29th.)
April 11th. Markets Committee. Electric lift for the Market Hall. Specifications, &c., from the executive officer, Works and Supplies Department, Civic Hall (deposit £1 1s.); tenders to the town clerk.

Leyton.—April 8th. Corporation. Two 1,000-kVA and two 500-kVA transformer kiosk sub-stations. (March 29th.)

London.—FULHAM.—April 17th. Borough Council. Two (or three) electrically operated luffing, slewing and travelling portal jib cranes (Section "N"). Specifications, &c., from borough treasurer, Town Hall (deposit £5 5s.); tenders to the town clerk.
LONDON & HOME COUNTIES J.E.A.—April 8th. Annual supply of general electrical accessories. (March 22nd.)
ST. MARYLEBONE.—April 30th. Borough Council. Underground cables for the year ending May 31st, 1936. (See this issue.)

Manchester.—April 11th. Electricity Committee. A.c. motors, time switches, transformers, kettles and meters for twelve months. (March 29th.)
April 17th. Static transformers for sub-stations. (March 29th.)
April 8th. Two neutral earthing switch equipments and resistor at Benchill sub-station and l.p. pipework at Stuart Street power station. (March 29th.)

Morecambe and Heysham.—April 11th. Corporation. Medium-pressure switchboards and 400-kVA transformer. (March 29th.)

New Zealand.—WELLINGTON.—Public Works Tenders Board. June 25th. Three 1,500-kVA single-phase transformers. (A.Y. 12963.)*
Post and Telegraph Department. May 2nd. Telephones. (A.Y. 12978.)*
Public Works Department. June 18th. Oil circuit-breakers. (A.Y. 12979.)*

Northern Ireland.—OMAGH.—April 16th. Committee of Management of Tyrone and Fermanagh Mental Hospital. Various works, including electrical, at the Omagh Mental Hospital. Specifications, &c., from V. H. Murnaghan, Lisonelly House; tenders to the clerk of the Hospital.

Portsmouth.—April 17th. City Council. Electrical work at St. Mary's Hospital, Milton. Specifications, &c., from the city engineer, Guildhall (deposit £1 1s.); tenders to the town clerk.

Richmond (SURREY).—April 26th. Waterworks Department. Horizontal centrifugal pump with electric motor. Specifications, &c., from the water engineer and manager, Hotham House, Heron Court (deposit £2 2s.); tenders to the town clerk.

Salford.—April 10th. Electricity Department. Electrical installation for 128 flats. Particulars from the city electrical engineer, Electricity Department, Frederick Road.

Sheffield.—April 12th. Electricity Department. Two machine panels, one metering panel and two feeder panels. (See this issue.)

South Africa.—PORT ELIZABETH.—Municipality. April 25th. Transformers, cable and sundry electrical material. (A.Y. 12990.)*
PRETORIA.—Union Tender & Supplies Board. May 3rd. Telephone switchboards. (A.Y. 12986.)*
JOHANNESBURG.—Municipality. April 26th. Magneto telephone switchboards. (A.Y. 12975.)*

Stoke-on-Trent.—April 10th. Electrical Engineer's Department. Overhead transmission lines. (March 29th.)

Wakefield.—April 15th. West Riding Public Assistance Committee. Various works, including electrical, at the new casual wards, Tadcaster. Specifications, &c., from the West Riding architect, County Hall; tenders to the clerk of the County Council.

Warrington.—April 10th. County Mental Hospital Visiting Committee. Electric generating plant for the hospital, Winwick. Particulars, &c., from the clerk and steward; tenders to the chairman of the Visiting Committee.
April 15th. Electricity Department. Transformer. (March 29th.)

West Hartlepool.—April 15th. Corporation. Meter locks. (See this issue.)

Weymouth and Melcombe Regis.—April 15th. Electricity Department. Cable. (See this issue.)

Worthing.—April 20th. Electricity Department. E.h.p. and l.p. cables. (See this issue.)

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed

Birmingham.—Education Department. Accepted. Electrical sundries for one year.—General Electric Co., Ltd.

Dover.—Electricity Department. Accepted. Annual contracts: Cables.—Pirelli-General Cable Works, Ltd. Meters.—Metropolitan-Vickers Electrical Co., Ltd. Transformers.—British Electric Transformer Co., Ltd.

Hull.—Telephones Committee. Accepted. Cable (£507).—British Insulated Cables, Ltd. Wire.—Callender's Cable & Construction Co., Ltd. (£78); F. Smith & Co. (£262). Switchboards (£575).—Ericsson Telephones, Ltd. Insulators (£137).—Doulton & Co., Ltd.

Liverpool.—Electric Power and Lighting Committee. Recommended. Supplies for twelve months: Cables, &c.—Callender's Cable & Construction Co., Ltd.; British Insulated Cables, Ltd.; Liverpool Electric Cable Co., Ltd.; Mersey Cable Works, Ltd. Electric motors.—Higgs Motors, Ltd.; Morecambe Electrical Equipment Co., Ltd.; Erskine, Heap & Co., Ltd. Electric cookers and kettles.—Automatic Electric Co., Ltd.; Hotpoint Electric Appliance Co., Ltd.
Transformer tap-changing gear (£1,360) and two transformers (£4,354).—English Electric Co., Ltd. Six boosters (£12,914).—C. A. Parsons & Co., Ltd. Switchgear (£22,397).—Ferguson, Pailin, Ltd. Alteration and re-erection of switchgear (£655), protective gear in connection with feeders (£872), two boosters (£4,100), and main switchgear (£3,760).—Metropolitan-Vickers Electrical Co., Ltd. Two transformers (£2,380).—Electric Construction Co., Ltd. Four reactors (£3,047).—British Thomson-Houston Co., Ltd. Replacement of grit collectors at Lister Drive power station (£5,400).—Davidson & Co.

London.—POPLAR.—Electricity Committee. Recommended. Isolating switch (£286).—Johnson & Phillips, Ltd.
BATTERSEA.—Electricity Committee. Recommended. For twelve months: Meters.—Chamberlain & Hookham, Ltd.; Ferranti, Ltd. Compound.—Dussek Bitumen & Taroleum, Ltd. Cables.—Callender's Cable & Construction Co., Ltd. Service and disconnecting boxes and cut-outs.—Callender's Cable & Construction Co., Ltd.; W. T. Henley's Telegraph Works Co., Ltd.

Manchester.—Electricity Committee. Recommended. Electric cookers.—Simplex Electric Co., Ltd.; General Electric Co., Ltd.; British National Electrics, Ltd.; Revo Electric Co., Ltd.; English Electric Co., Ltd.; Carron Company. Replacement of

grit arrestors at Barton power station.—Babcock & Wilcox, Ltd. Switchgear.—Ferguson, Pailin, Ltd. Two transformers with automatic voltage regulating equipment.—Ferranti, Ltd. Cable.—British Insulated Cables, Ltd.; W. T. Glover & Co., Ltd.

Middlesex.—County Council. Education Committee. Recommended. Electric lighting, heating and power installation at the County Girls' School, Mill Hill (£1,142).—F. Troy & Co., Ltd. This was the lowest of twenty-two tenders, the highest being £2,258.

Oxford.—Electricity Committee. Accepted. Transformers.—Hackbridge Electric Construction Co., Ltd. Cables.—British Insulated Cables, Ltd.; Derby Cables, Ltd.; Metropolitan Electric Cable & Construction Co., Ltd.

Salford.—Light, Heat and Power Committee. Accepted. Materials and stores for twelve months from April 1st: Transformers.—British Electric Transformer Co., Ltd. Motors.—Crompton, Parkinson, Ltd.; Laurence, Scott & Electromotors, Ltd. Starters for motors.—Allen West & Co., Ltd.; George Ellison, Ltd.; Erskine Heap & Co., Ltd.; J. G. Statter & Co., Ltd. Electric cookers.—Walker, Hunter & Co., Ltd.; British National Electrics, Ltd. Electric fires.—Falkirk Iron Co., Ltd. Electric wash-boilers.—Samuel Simister. Switches, switch-fuses, &c.—S. Bill & Co., Ltd. Switch-fuses.—General Electric Co., Ltd.; Wm. Sanders & Co. (Wednesbury), Ltd. Switchgear.—Metropolitan-Vickers Electrical Co., Ltd.; English Electric Co., Ltd.; Switchgear & Cowans, Ltd.; A. Reyrolle & Co., Ltd.; Harland Engineering Co., Ltd. Compound.—Dussek Bitumen & Taroleum, Ltd.; Berry, Wiggins & Co., Ltd. Meters.—British Sangamo Co., Ltd.; Ferranti, Ltd.; British Electric Meters, Ltd.; Measurement, Ltd.; B.I. Cables, Ltd.; Metropolitan-Vickers Electrical Co., Ltd. Thermal storage heaters.—Simplex Electric Co., Ltd.; Archibald Low Electrics, Ltd. Hot water circulators.—Electric Fires, Ltd.; Archibald Low Electrics, Ltd. Cable tiles.—H. J. Baldwin & Co.

Transformer and switchgear for the West Street sub-station (£7,627) and switchgear for the Agecroft power station (£3,580).—Metropolitan-Vickers Electrical Co., Ltd. Switchgear for the Buile Hill sub-station (£1,445).—Harland Engineering Co., Ltd.

Health Committee. Accepted. Private automatic telephone system at Ladywell Sanatorium and Isolation Hospital (£348).—A. E. Sudlow & Co., Ltd.

Purchasing Committee. Accepted. Materials and stores during the year ending March 31st, 1936. Cable.—Connollys (Blackley), Ltd.; Derby Cables, Ltd.; Mersey Cable Works, Ltd.; Ward & Goldstone, Ltd.; W. T. Glover & Co., Ltd. Traction lamps.—Siemens Electric Lamps & Supplies, Ltd. Fuse wire.—Frederick Smith & Co.

Sheffield.—Electricity Committee. Accepted. Transformers and Scott-connected sets (£3,368).—Electric Construction Co., Ltd. Protective gear for feeders (£2.589) and switchgear for sub-stations (£1,890).—A. Reyrolle & Co., Ltd.

Health Committee. Recommended. X-ray apparatus at hospital (£1,101).—T. W. Sampson.

Tobermory.—Town Council. Accepted. Additional plant for the electricity supply (£602).—D. H. Morris & Co.

Wimbledon.—Electricity Committee. Accepted. Cable.—Standard Telephones & Cables, Ltd.; Telegraph Construction and Maintenance Co., Ltd.; Pirelli-General Cable Works, Ltd.

Forthcoming Events

Association of Mining Electrical Engineers (*West Wales Branch*).—Saturday, April 6th. Y.M.C.A., Swansea. Annual dinner. (*South Wales Branch*).—Saturday, April 13th. Cardiff. "Utilisation of Electricity in Coal Production." Messrs. B. L. Metcalf and J. Hancock.

Illuminating Engineering Society.—Tuesday, April 9th. Institution of Mechanical Engineers, S.W.1, 7 p.m. Short papers.

Electrodepositors' Technical Society.—Wednesday, April 10th. Northampton Polytechnic Institute, E.C.1. 8.15 p.m. "Electrodeposition of Tin for Refrigeration Purposes." Mr. E. A. Johnson.

Institution of Electrical Engineers.—Thursday, April 11th. Institution, London. 6 p.m. "The Droitwich Broadcasting Station." Messrs. R. Ashbridge, H. Bishop, and B. N. MacLarty. (*Meter and Instrument Section*).—Friday, April 5th. Institution. 7 p.m. Papers by Mr. H. M. Barlow. (*Mersey and N. Wales (Liverpool) Centre*).—Monday, April 8th. The University, Liverpool. 7 p.m. Annual general meeting. (*North-Eastern Centre*).—Monday, April 8th. Armstrong College, Newcastle-upon-Tyne. 7 p.m. Annual general meeting. Paper by Messrs. N. Ashbridge, H. Bishop and B. N. MacLarty. (*South Midland Centre*).—Monday, April 8th. James Watt Memorial Institute, Birmingham. 7 p.m. Annual general meeting. "Electrical Developments in the U.S.S.R." Mr. A. Monkhouse. (*North-Western Students' Section*).—Tuesday, April 9th. Engineers' Club, Manchester. 7.15 p.m. Annual general meeting. "Liverpool Exchange Paper." (*Scottish Centre*).—Tuesday, April 9th. 39, Elmbank Crescent, Glasgow. 7.30 p.m Annual general meeting. (*Hampshire Sub-Centre*).—Wednesday, April 10th. University College, Southampton. 7.30 p.m. Short Papers. (*Transmission Section*).—Wednesday, April 10th. Institution, London. 6 p.m. "The Effect of Legislation and Regulations upon Electricity Distribution." Mr. W. Fennell. (*Irish Centre (Dublin)*).—Friday, April 12th. Gaiety Theatre, Dublin. 4 p.m. Faraday Lecture. "Electricity in the Life of To-day." Prof. E. W. Marchant. (*London Students' Section*).—Friday, April 12th. Institution, London. 7 p.m. Address by Prof. W. M. Thornton.

Birmingham Electric Club.—Friday, April 12th. Grand Hotel, Birmingham. 7 p.m. Particulars to be announced later.

Electrical Association for Women.—Friday, April 12th. Park Lane Hotel, W.1. 9 p.m. Annual ball.

Electrical Industries Benevolent Association.—Friday, April 12th. Savoy Hotel, W.C.2. 12 p.m. Annual general meeting. 1 p.m. Luncheon.

Notes

E.P.E.A. Dinners

The fifteenth annual dinner and reunion of the London Western Section of the Association was held on March 30th at St. Ermin's, S.W.1. Mr. L. W. Stretton presided over a gathering of over 170, about fifty more than last year. Ald. J. Chuter Ede, J.P. (chairman of the London J.E.A.), proposed the toast of "The Association," and the response was made by Mr. C. Cooper (pres., E.P.E.A.), who said that owing to the cost of living clause in the present schedule of salaries, which was negotiated in 1920, many members were paid considerably less now than they were then in spite of the increased prosperity of the industry. Individual undertakings had recognised this hardship in a practical manner and others were awaiting a lead from the National Joint Board. The Association was doing much through its technical groups to improve the engineering status of its members. Mr. A. L. Lunn proposed "The Ladies," and Mrs. Samels responded. "Our Section and Our Chairman," was proposed by Mr. W. J. Oswald, and Mr. L. W. Stretton, who responded, paid a special tribute to Mr. Oswald for his interest in the Association from its beginning and also to Mr. E. J. Hildebrand (hon. secretary) and Mr. W. Cornet, who organised the function.

There was a large attendance at the annual dinner-dance at the Edgbaston Rooms, Birmingham, on Friday, of the Birmingham and District Section of the Electrical Power Engineers' Association. Mr. A. E. Farmer, chairman of the section, presided. The Lord Mayor of Birmingham (Ald. S. J. Grey) in responding to the toast of "The City of Birmingham," stated that the city's enterprise in providing for the future was responsible for its greatness and for attracting new trade. The electrical industry had made a worthy contribution in this respect. Professor W. Cramp, head of the Electrical Engineering Department of the University of Birmingham, said the ideals and objects of the Association were efficiency as regarded the undertaking they were serving; the proficiency of the individual; remuneration and status or equity; and assistance for those who were down and out. The reply was by Mr. J. F. Sarvent, vice-president of the Association. Mr. J. M. Kennedy, Electricity Commissioner, responded to the toast of "The Guests," proposed by the chairman.

Slow Bulk-supply Meters

The Southwark Electricity Committee reports that it has had under consideration correspondence which has taken place between the City of London Electric Lighting Co., Ltd., and the borough electrical engineer, relative to the meters installed by the company on the bulk supply mains. The company alleges that these meters have been under-registering since they were installed in October, 1932, and it has submitted a claim amounting to £822 in respect of electricity estimated to have been taken but not registered. When the defect was suspected the electrical engineer suggested that the meters should be tested by an independent authority; a test showed that they were slow. The company's claim was calculated in accordance with the result of these tests, but it is based on the assumption that the meters were incorrect when they were installed. The Committee suggests, however, that as the meters were then new, it is reasonable to assume that the makers had tested them before delivery and found them to be correct. In the circumstances the Committee suggests that it would be equitable to pay approximately one-half of the amount claimed.

The London Branch of the E.A.W.

The inaugural luncheon arranged by Miss V. Brice for the London Branch of the Electrical Association for Women was held on March 28th at the Criterion Restaurant, W.1, when Mrs. H. Bentham presided over a gathering of about 160 people. The toast of "Electricity and the Women" was proposed by Mr. J. W. J. Townley, who said that, from his own experience at West Ham, propaganda among working-class women was no longer necessary. All they required was electrical apparatus on the lowest terms which would be more quickly secured if women who were better off financially would buy their electrical apparatus outright. He also gave examples of the disproportionate sums spent by well-to-do people on things that did not give the same satisfaction as electricity. When electricity was fully established in the home its users would not regard the cost so closely as they did now, just as they no longer compared its cost for lighting with that of gas, as they once did. He then put in a plea for the planned kitchen which would contain a space for every piece of apparatus that would ultimately be required. A vote of thanks was proposed by Mrs. Pender Chalmers, and Miss C. Haslett also spoke.

Appointments Vacant

Meter repairer and tester for Peterborough Electricity Department.

Resident mechanical engineer at the Holloway Sanatorium, Virginia Water, Surrey.

Switchboard attendant for Darlington Electricity Department.

Deputy borough electrical engineer for Finchley.

(See our classified advertisements.)

Our Personal Column

Electrical men are invited to keep readers of the "Electrical Review" posted concerning their movements

Mr. A. Read, the author of the article on earth faults on lift control gear, which appears on page 480 of this issue, served his apprenticeship with Messrs. Adam Grimaldi & Co., Vauxhall. He subsequently occupied positions with Messrs. Gwynnes, of Chiswick, Tilling-Stevens Motors, Ltd., and the Medway Safety Lift Co., Ltd. For the last nine years he has been chief electrical engineer of the Lift and Escalator Department of Messrs. J. & E. Hall, Ltd., Dartford, Kent.

Mr. A. Read

Mr. E. H. Barrenger, F.C.I.S., secretary of the St. James' & Pall Mall Electric Light Co., Ltd., for many years, and with the company in that and other capacities for nearly thirty-four years, is retiring, owing to ill health, on May 4th. He was also joint hon. secretary, with Mr. L. Gordon, of a joint committee of five of the West End electricity supply companies and the London and Home Counties Joint Electricity Authority, which was set up to discuss matters of common interest to the companies and the Authority. His resignation from the secretaryship of the London Electricity Supply Association was reported in our issue of August 3rd last, when we also published his portrait. Mr. Barrenger's present address is 49, Chandos Avenue, N.20.

Mr. H. F. J. Thompson, who has been acting as deputy borough electrical engineer at Battersea since the death of Mr. F. A. Bond, has now been appointed borough electrical engineer by the Battersea Council.

Mr. R. Lonsdale, of Nelson, has been recommended by the Light, Heat and Power Committee of Salford Corporation for the position of technical assistant to the consumers' engineer at a salary of £271 per annum, and the recommendation has been approved by the Staffs Committee.

Mr. H. E. Warren has been awarded the Lamme Medal by the American Institute of Electrical Engineers "for outstanding contributions to the development of electric clocks and the means for controlling central station frequencies." For nearly thirty years Mr. Warren has devoted his attention to electric clocks. Starting with battery and impulse clocks, he soon realised their limitations, and conceived the idea of an automatically controlled frequency at the power station, whereby everyone connected to the mains would have exact time at his disposal. The first essential was a compact synchronous motor, and he developed that known in the United States as the Warren motor and in this country as the "Synclock."

At the National Finals of the E.D.A. Public Speaking Competition held at Brettenham House, W.C., on March 25th, the first prize in the ladies' competition was awarded to **Miss J. M. Fright,** of the Westminster Electric Supply Corporation, Ltd., the winner in the men's competition being **Mr. A. C. Hazel,**

[*Alexander Corbett*

Miss J. M. Fright and Mr. A. C. Hazel, winners of the national finals of the E.D.A. Public Speaking Competition

sales superintendent with the South Somerset & District Electricity Co., Ltd. The second prizes were awarded to Miss B. M. Tucker, of the Oxford City Electricity Department, and Mr. R. H. Fell, of the North Metropolitan Electric Supply Co.

Mr. H. Adam, electrical engineer to the Seaham Harbour Urban District Council, has been appointed chief electrical engineer to Coal & Allied Industries, Ltd., at its new coal-oil plant now under construction at Seaham Harbour. Mr. Adam was formerly with the Annfield Plain Electricity undertaking, and went to Seaham Harbour in 1927.

Mr. H. Adam

Lt.-Col. F. A. Cortez Leigh, chief consulting electrical engineer to the London, Midland & Scottish Railway, retired on Monday last. He resigned last year from the position of electrical engineer to the company and the old L. & N.W. Railway, after twenty-five years' service, but was retained in an advisory capacity. An account of his career was published in our issue of May 4th last, together with his portrait and that of his successor as electrical engineer, Mr. C. E. Fairburn.

Mr. T. L. Horn, M.I.E.E., divisional electrical engineer in the Tramways Department of the London Passenger Transport Board, retired at the end of March. Mr. Horn was first associated with the London County Council tramways as the representative of Messrs. Siemens Bros., to whom was entrusted the installation of the original h.p. cables. Later, he was appointed distribution engineer to the undertaking, and he has thus seen the evolution of London transport from the days of horse-drawn traffic to the present "Pullman" vehicles. He received his training as an electrical engineer at the University College, Nottingham. A farewell dinner and presentation was held at Frascati's on March 29th, at which past and present colleagues attended. In addition to the principal officers of the Tramways Department of London Transport, there were present Messrs. A. L. C. Fell, J. H. Rider, P. L. Riviere, J. W. J. Townley, H. E. Blackiston, E. W. Dickinson, F. Schofield, and many others. A loving cup was piped in by Mr. Townley, and the presentation of a silver tea service was made by the chairman, Mr. T. E. Thomas.

Mr. T. L. Horn

Mr. R. McLeod, the former deputy transport manager to Edinburgh Corporation, has been recommended by the Public Utilities Committee of the city for the appointment of interim manager. The Committee has decided that the vacant managership shall be advertised at a salary of £1,300, rising to £1,700 per annum.

Mr. A. Mears, meter superintendent with the Edinburgh Corporation Electricity Department, has been presented with an electric fire on his retirement after thirty-nine years' service. The presentation was made by Mr. A. Robertson at a recent gathering of the Department's Social and Welfare Club.

Mr. B. Welbourn, chief engineer of British Insulated Cables, Ltd., is to have the honorary degree of M.Eng. conferred on him by the

Mr. E. P. Higgs, B.Sc., A.C.G.I., A.M.I.E.E., assistant engineer to the Shanghai Power Co., who is at present on leave in England

Senate and Council of the Liverpool University on May 24th. Mr. Welbourn obtained his earliest works experience in the service of Willans & Robinson, of Thames Ditton, and in 1927 became chief engineer of British Insulated Cables, Ltd. He is a past vice-president and a present member of the Council of the Institution of Electrical Engineers and a past-chairman of the Liverpool Centre of the Institution.

Obituary

Mr. John Pullar, Durban, Natal, and formerly managing director of Messrs. Vincent & Pullar, electrical engineers, died on March 5th, and was cremated at the Stellawood Crematorium on the following day. Mr. Pullar, who was forty-seven years of age, was educated at St. Paul's, London, and received his instruction in electrical engineering with the Newcastle-on-Tyne Electricity Supply Co., and graduated at Durham University. In 1910 Mr. Pullar relinquished his position with the Newcastle Co. and went to South Africa, where he took up an appointment as control engineer with the Victoria Falls & Transvaal Power Co. in Johannesburg. Then he went to Durban and entered the service of Messrs. Thomas Barlow & Co., and later took up the position of managing director of the firm of John Vincent, which subsequently became Vincent & Pullar, Ltd. In later years Mr. Pullar was associated with engineering in the Natal sugar industry.

Major B. S. Benning, an engineer of the Aircraft Department of Marconi's Wireless Telegraph Co., Ltd., who was struck by the propeller of an aeroplane when starting the engine at Croydon Aerodrome, died on March 28th in Croydon Hospital from injuries to his left arm and side. Major Benning, who was forty-two years of age, was an experienced pilot as well as a wireless engineer. He joined the Marconi Co. in 1912 and as a wireless engineer played an important part in the development of wireless communication in many parts of the world, including Chile, Mexico, India and Greece. From 1925 to 1932 he was a special representative of the company in Japan, where he was responsible for the installation of a number of broadcasting stations in the principal towns.

Mr. Austin Walters, founder of Messrs. Austin Walters & Son, Ltd., whose death we recently recorded, was apprenticed at the early age of ten to a sheet-metal worker in Bristol. In his early twenties he took up the position of gas engineer at the Theatre Royal, Manchester, later being transferred to the Prince's Theatre, where he introduced and saw many changes in theatre lighting from gas to electricity, for which he himself was responsible to a very large extent. He stayed there twenty-five years, and after a short rest from theatre work he was engaged by Sir Oswald Stoll as chief engineer of the Manchester Hippodrome, from which position he retired in 1914.

Mr. H. G. Wightwick.—The death occurred, at his residence at Staplehurst, on March 24th of Mr. Humphrey Guest Wightwick, formerly manager of the Singapore Electric Tramways, Ltd. He was fifty-five years of age.

Monsieur P. Eschwege.—The death recently occurred in Paris of M. Paul Eschwege, honorary president of the French Syndicate Professionnel des Producteurs et Distributeurs d'Energie Electrique.

Will.—Mr. A. H. Beatty, one of the original directors of Balfour Beatty & Co., and a director of other companies, left £97,477 (net personalty £87,280).

Parliamentary News (by our special reporter)

OBJECTIONS to clauses in the South Shields Corporation Bill dealing with the finances of the municipal electricity undertaking were considered on March 28th by a Select Committee of the House of Commons. Sir Henry Jackson (Wandsworth, U.) presided.

Included in the Bill was a provision which would permit the Corporation to establish a reserve fund for the electricity undertaking from the rates. Mr. H. Royston Askew, counsel for the South Shields Gas Co., said that as the Bill stood the Corporation would be empowered to take what money it liked from the common purse in order to form a reserve fund provided the fund did not exceed a certain limit, and if the Corporation thought fit it could use that reserve fund for capital purposes. He asked the Committee to amend the Bill so that the reserve fund should be established only when the accounts of the undertaking showed a surplus out of which the reserve could be formed.

The Committee decided to accept the amendment suggested. In announcing the decision the chairman said he wished to make it clear that there was no intention of casting any reflection on the Corporation. The Committee was of opinion that it was a just principle to debar a Corporation from applying out of the general rate fund any money to form a reserve fund for any undertaking.

The Bill as amended was ordered to be reported to the House for third reading.

Electricity Supply Profits

On March 27th Mr. Daggar asked the Minister of Transport if he would state the profits of company and local authority electricity undertakings for the years 1932-33, and 1933-34, and the price paid per ton for coal and coke during the same years.

Mr. Hore-Belisha said that the total gross surplus (before deduction of income tax) of electricity undertakings, in the year 1932-33, was, in the case of public authorities, £20,288,337, and in the case of companies £13,245,773, and the average price per ton of coal and coke used in generating stations was about 15s. 3d. Corresponding figures for the year 1933-34 were not yet available.

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

Belling & Co., Ltd.—Private company. Registered March 27th. Nominal capital £100,000 in 99,500 preferred ordinary shares of £1 each and 10,000 founders' shares of 1s. each. The objects are to acquire the goodwill of the business of a manufacturing electrical engineer and inventor, carried on by Chas. R. Belling, M.I.E.E., at Bridge Works, Southbury Road, Enfield, as "Belling & Co." C. R. Belling is permanent governing director.

Bustler Electric Co. (London), Ltd.—Private company. Registered March 22nd. Capital, £2,000 in £1 shares. Objects: To acquire the right to purchase and sell vacuum cleaners and to adopt an agreement between the Forward Electric Co., Ltd., and others, and to carry on the business of wholesale and retail dealers in and exporters and importers of home, office and factory equipment, &c. The first directors are: R. H. Edwards, 56, Nibthwaite Road, Harrow, and E. W. Grimsdell, 45, Christchurch Avenue, N.12. Registered office: Bank Chambers, 1A, Watling Avenue, Burnt Oak, Middlesex.

Haslam Foundry & Engineering Co., Ltd.—Private company. Registered March 26th. Capital, £40,000 in £1 shares. Objects: To acquire the goodwill of the foundry and refrigerating business heretofore carried on by, and certain of the assets and liabilities of Haslam & Newton, Ltd. The directors are: S. R. Beale, Kingsborough Gardens, Glasgow, E. W. Elliott, 24, Radley Road, Wallasey, and P. C. Cooper-Parry, 102, Friar Gate, Derby (nominated by Haslam & Newton, Ltd.). Solicitors: Linklaters & Paines, 2, Bond Court, Walbrook, E.C.4.

J. B. Rudkin & Co., Ltd.—Private company. Registered March 25th. Capital, £500 in £1 shares. Objects: To carry on the business of marketers of electric lighting, cooking, heating, power and all other kinds of electrical fittings, and equipment, &c. The directors are: J. B. Rudkin (permanent managing director and chairman), Mount Joy, Hill View Road, Rayleigh, Essex, and E. L. Stacey, 70, Station Road, Barnes, S.W.12.

Salisbury Transformer & Electrical Co., Ltd.—Private company. Registered March 27th. Capital, £1,000 in 500 6 per cent. cumulative preference and 500 ordinary shares of £1 each. Objects: To acquire the business of an electrical and general engineer now carried on by A. T. Burden at Salisbury, Wilts, as the Salisbury Transformer & Electrical Co. The permanent directors are: A. T. Burden, 14, Mill Road, Salisbury, and T. C. Morgan, "A" Lines, Bulford Camp.

Tanat Valley Electricity Co., Ltd.—Private company. Registered March 25th. Capital, £1,500 in £1 shares. Objects: To acquire the business of an electricity supply company carried on by Thomas Smith at Llanrhaeadr-Ym-Mochnant, in the counties of Montgomery and Denbigh. The directors are: T. Smith and Mrs. M. Smith, both of 67, Bath Road, Wolverhampton. Secretary: Mrs. Maude Smith. Registered office: Electricity House, Llanrhaeadr-Ym-Mochnant.

Thomas Jones & Sons (Walthamstow), Ltd.—Private company. Registered March 26th. Capital, £5,000 in £1 shares. Objects: To acquire the business of dealers in electrical equipment and lighting fittings, &c., lately carried on by F. W. Wager, at 20 and 22, High Street, Walthamstow, E.17. The permanent directors are: Mrs. H. F. E. Wager, and Miss L. M. Wager (managing director), both of 22, High Street, E.17. Registered office: 20, High Street, Walthamstow, E.17.

Scottish Western Electrical Contractors, Ltd.—Private company. Registered in Edinburgh March 29th. Capital, £2,000 in £1 shares. Objects: To acquire the business of Brodie & Hall, Ltd., electrical engineers and contractors, Greenock. The directors are: A. N. Lindsay, 38, Cathcart Street, Greenock, and three others.

Sedbergh Electricity Supply Co., Ltd.—Public company. Registered March 30th. Nominal capital, £10,000 in £1 shares. Objects: To acquire from J. J. Martin (1) the benefit of a Special Order made by the Electricity Commissioners under the Electricity (Supply) Acts, 1882 to 1933, in respect of Sedbergh, Yorks, on November 15th, 1934, and (2) the business of an electrical supplier and manufacturer carried on at London House, Sedbergh, as the "Sedbergh Electric Co." The first directors are: J. Martin, Near Close, Sedbergh (permanent managing director), and three others. Registered office: London House, Sedbergh.

Caledonian Electric Services, Ltd.—Private company. Registered March 30th. Capital, £1,000 in £1 shares. Objects: To carry on the business of electrical engineers, contractors, &c. The directors are: F. Arnett (chairman), The Laines, East Dean, near Eastbourne; and two others. Registered office: 160, High Street, Camden Town, N.W.1.

High Level Batteries, Ltd.—Private company. Registered March 29th. Capital, £1,000 in £1 shares. Objects: To acquire the business of a dry battery manufacturer carried on by J. G. Wilkins at Oxford Street, Newcastle-on-Tyne. The permanent directors are: J. G. Wilkins (managing director), 17, Oxford Street, Newcastle-on-Tyne, and two others. Solicitors: Dees & Thompson, Newcastle-on-Tyne.

"Reflexon," Ltd.—Private company. Registered March 27th. Capital, £300 in 1s. shares. Objects: To carry on the business of manufacturers of and dealers in electrical and wireless apparatus, &c. The directors are: R. Terrell, 24, Queen's Avenue, Muswell Hill, N.10, and two others. Registered office: 2-4, High Road, Ilford, Essex.

Victoria Radio Services (Cardiff), Ltd.—Private company. Registered March 28th. Capital, £300 in £1 shares. Objects: To carry on the business of designers and manufacturers of and dealers in all kinds of wireless receivers, transmitters, &c. The subscribers are: H. T. Barry, 26, Waterloo Road, Cardiff; and A. H. Barry, 27, Rawden Place, Cardiff. Secretary: Albert H. Barry.

Painton & Co., Ltd.—Private company. Registered March 30th. Capital, £300 in £1 shares. Objects: To carry on the business of electrical and general engineers, &c. The directors are: P. R. Painton, 39, Newland, Northampton; and W. S. Cator, Brooklyn, Kettering Road, Moulton, Northampton. Registered office: 29, Newland, Northampton.

Cathodeon, Ltd.—Private company. Registered March 13th. Capital, £100 in £1 shares. Objects: To carry on the business of manufacturers of, agents for and dealers in cathode tubes and electric discharge tubes, thermionic valves, wireless and television apparatus, &c. The first directors are: R. M. Ellis, T. A. W. Robinson and C. O. Stanley. Solicitors: Bartlett & Gluckstein, 199, Piccadilly, W.1.

Lumiere, Ltd.—Private company. Registered in Edinburgh March 6th. Capital, £100 in £1 shares. Objects: To carry on the business of radio and electrical engineers, electricians, mechanical, consulting, structural and general engineers, &c. The first directors are: W. B. Nimmo, 343, Kirk Road, Wishaw, and three others. Registered office: 34, Sunnyside Road, Coatbridge, Lanarkshire.

Towyn & Aberdovey Assisted Wiring Co., Ltd.—Private company. Registered March 23rd. Capital, £100 in £1 shares. Objects: To carry on the business of electricians, electrical engineers and contractors, &c. The subscribers are: W. J. Gibson, 93, Watford Road, Croxley Green, Herts, and E. A. Spalding, 57, Longley Road, Tooting, S.W.17. Solicitors: A. M. Longhurst & Butler, 136, Fenchurch Street, E.C.

Synchro-Service, Ltd.—Private company. Registered March 21st. Capital, £100 in £1 shares. Objects: To carry on the business of makers of electric clocks, time recorders, private telephones and telegraphs, &c. The subscribers are: W. S. Philcoe and F. T. Jackson, both of Hollingsworth Works, West Dulwich, S.E.21. Secretary: Geo. H. Field, Hollingsworth Works, Martell Road, S.E.21.

Shaw Moving Neon, Ltd.—Private company. Registered March 26th. Capital, £500 in £1 shares. Objects: To acquire the letters patent, &c., in connection with neon luminous tube installations, and to carry on the business of manufacturers of and dealers in signs and advertisements, &c. The permanent directors are: T. A. Roberts, 10, St. Hilary's Drive, Wallasey, and G. S. Shaw, 27, Knowsley Road, Wallasey. Secretary: S. B. Smith. Registered office: 1-3, Stanley Street, Liverpool, 1.

Atkinson-Mare, Ltd.—Private company. Registered March 28th. Capital, £500 in £1 shares (300 5 per cent. redeemable cumulative preference and 200 ordinary). Objects: To carry on the business of dealers in all kinds of refrigerators and electrical machinery, wireless equipment and supplies, &c. The permanent directors are: C. A. C. Atkinson (chairman and managing director) and V. W. Atkinson, both of Langford's Hotel, Third Avenue, Hove. Secretary: Mrs. V. W. Atkinson. Registered office: 160, Church Road, Hove.

Regentone Products, Ltd.—Private company. Registered March 28th. Capital, £7,875 in 7,500 7 per cent. cumulative preference shares of £1 each and 7,500 ordinary shares of 1s. each. Objects: To carry on the business of manufacturers and vendors of radio receiving sets, &c. The subscribers are: S. Jarrett and G. Shelton Smith, both of 17, Shaftesbury Avenue, W.1. Solicitors: Stanley Jarrett & Co., 17, Shaftesbury Avenue, W.1.

Returns of Electrical Companies

B.E.C. (British Electrical Corporation), Ltd.—The nominal capital has been increased by the addition of £24,900 beyond the registered capital of £100. The additional capital is divided into 398,000 ordinary shares of 1s. and 20,000 7 per cent. cumulative preference shares of 5s. each. The 100 ordinary shares of £1 in the original capital have been sub-divided into 2,000 ordinary shares of 1s. each.

Chislehurst Electric Supply Co., Ltd.—The nominal capital has been increased by the addition of £35,000 in £1 ordinary shares beyond the registered £15,000.

Basingstoke Wire Broadcasting Service, Ltd.—Capital, £4,000 in £1 shares. Return dated March 16th, 1934 (filed February 27th, 1935). 3,973 shares taken up. £2,768 paid, £1,205 considered as paid. Mortgages and charges: £1,000.

Union Radio Co., Ltd.—Capital, £5,000 in 3,500 5 per cent. cum. participating preference and 1,500 ordinary shares of £1 each. Return dated November 6th, 1934. 1,000 ordinary shares taken up. £1,000 paid. Mortgages and charges nil.

Streamline Radio, Ltd.—Particulars filed of debentures not exceeding £5,000 (inclusive of £2,500 already registered), authorised February 12th, 1935, charged on the company's property, present and future, including uncalled capital, the amount of the present issue being £2,500.

Economic Radio, Ltd.—Capital, £1,000 in £1 shares. Return dated December 25th, 1934. 800 shares taken up. £575 paid, £225 considered as paid. Mortgages and charges nil.

Hammonds Radio, Ltd.—The nominal capital has been increased by the addition of £700 in £1 ordinary shares beyond the registered capital of £300.

Radio Instruments, Ltd.—Satisfaction on February 16th, 1935, of debenture dated August 10th, 1934, and registered August 17th, 1934. (According to the register of mortgages, the debenture registered August 17th, 1934, originally secured £12,000.)

Wired Wireless, Ltd.—Capital, £1,000 in 500 preference shares of £1 and 10,000 deferred shares of 1s. each. Return dated December 25th, 1934. 400 preference and 4,002 deferred shares taken up. £600 2s. paid. Mortgages and charges nil.

Carrington & Button, Ltd.—Capital, £6,000 in £1 shares. Return dated December 20th, 1934. 4,887 shares taken up. £1,803 paid, £3,084 considered as paid. Mortgages and charges: £500.

W. Monks & Co., Ltd.—Capital, £1,500 in £1 shares. Return dated December 29th, 1934. All shares taken up. £750 paid, £750 considered as paid. Mortgages and charges nil.

Tel-a-Lite & Accessories, Ltd.—Capital, £500 in £1 shares. Return dated October 26th (filed November 12th), 1934. All shares taken up. £467 paid, £33 considered as paid. Mortgages and charges nil.

J. R. Marsden & Co., Ltd.—Satisfaction to the extent of £1,500 on March 14th, 1935, of debenture dated August 26th, 1922, and registered August 29th, 1922.

Eco Power, Ltd.—Capital, £1,000 in £1 shares. Return dated November 13th, 1934. All shares takes up. £1,000 paid. Mortgages and charges nil.

Amps, Ltd.—Capital, £100 in £1 shares. Return dated July 25th, 1934 (filed February 12th, 1935). 10 shares taken up. £10 paid. Mortgages and charges, £300.

F. Jeffery, Ltd.—N. H. Keen, 53, London Road (Southend-on-Sea, ceased to act as receiver and manager on March 11th, 1935.

McGoff & Vickers, Ltd.—Capital, £2,000 in £1 shares. Return dated November 30th, 1934. 1,750 shares taken up. £1,750 paid. Mortgages and charges nil.

Thames Electric Co., Ltd.—Particulars filed of debentures not exceeding £500, authorised February 14th, 1935, charged on the company's property, present and future, including uncalled capital, the amount of the present issue being £500.

Viking Sales, Ltd. (in liquidation).—Horner S. Wilson, 41, Spring Gardens, Manchester, 2, ceased to act as receiver for the debenture holders on February 28th, 1935.

British Electrical Export Co., Ltd.—Capital, £2,000 in £1 shares. Return dated July 23rd, 1934 (filed January 18th, 1935). 198 shares taken up. £198 paid. Mortgages and charges nil.

Egyptian Power Syndicate, Ltd.—Capital, £10,000 in £1 shares. Return dated December 24th, 1934. Two shares taken up. £2 paid. Mortgages and charges, nil.

Bray Markham & Reiss, Ltd.—Capital, £20,000 in 10,000 6 per cent. preference and 10,000 ordinary shares of £1. Return dated December 26th, 1934. 10,000 preference and 7,080 ordinary shares taken up. £16,080 paid on 10,000 preference and 6,080 ordinary shares. £1,000 considered as paid on 1,000 ordinary. Mortgages and charges, nil.

R. A. Poole (London), Ltd.—Capital, £1,000 in £1 shares. Return dated December 24th, 1934. All shares taken up. £10 paid. £990 considered as paid. Mortgages and charges, nil.

Yale Electric Power Co., Ltd.—Capital, £20,000 in 3,300 preference and 16,700 ordinary shares of £1. Return dated November 18th, 1934. 1,000 preference and 16,70 0ordinary shares taken up. £16,000 paid on 1,000 preference and 15,000 ordinary shares, £1,700 considered as paid on the remainder. Mortgages and charges: £3,496 (bank overdraft secured by debentures).

Parmiter, Hope & Sugden, Ltd.—Satisfaction in full on February 28th, 1935, of mortgage, further charge and charge dated August 15th, 1922, May 10th, 1923, and July 6th, 1931, and registered August 17th, 1922, May 14th, 1923, and July 11th, 1931, respectively.

United River Plate Telephone Co., Ltd.—Capital, £8,000,000 in 1,520,000 ordinary, 40,000 preference and 40,000 unissued shares of £5 each. Return dated September 12th, 1934. 1,520,000 ordinary and 40,000 preference shares taken up. £7,720,000 paid on 1,504,000 ordinary and 40,000 preference shares. £80,000 considered as paid on 16,00 ordinary shares. Mortgages and charges: £300,000.

Weald Electricity Supply Co., Ltd.—The nominal capital has been increased by the addition of £300,000 in £1 ordinary shares beyond the registered capital of £300,000.

Whittaker Bros., Ltd.—Capital, £7,000 in 1,000 cumulative preference, 5,000 "A" ordinary, and 1,000 "B" ordinary shares

of £1. Return dated December 31st, 1934 (filed February 12th, 1935). 3,907 shares (class not stated) taken up. £3,207 paid, £700 considered as paid. Mortgages and charges nil.

Venner Time Switches, Ltd.—The nominal capital has been increased by the addition of £30,000 in £1 ordinary shares beyond the registered capital of £60,000.

Arrow Electric Switches, Ltd.—The nominal capital has been increased by the addition of £3,000 in £1 shares beyond the registered capital of £2,000.

County of London Electric Supply Co., Ltd.—The nominal capital has been increased by the addition of £2,000,000 beyond the registered capital of £12,000,000. The additional capital is divided into 1,000,000 4 per cent. cumulative preference and 1,000,000 ordinary shares of £1 each.

Costa Rica Electric Light & Traction Co., Ltd.—Capital, £130,000 in £1 shares. Return dated December 5th, 1934. All shares taken up. £7 paid. £129,993 considered as paid. Mortgages and charges, £239,300.

City Notes

The Scottish Power Co., Ltd., held its annual meeting on March 29th, when Mr. G. Balfour, who presided, said that with regard to their subsidiary companies, the Rannoch hydro-electric power station of the Grampian Co. had now been in continuous operation for over four years and had justified their expectations. The Tummel power station, which came into operation in November, 1933, had been in continuous service in conjunction with the Rannoch power station. Work on the construction of the Loch Garry section of the Grampian hydro-electric development had now commenced. This involved boring a tunnel about five miles in length, and would take between two and three years to complete. By utilising the water from the Loch Garry watershed they would provide an additional 11,000-kW output from the Rannoch and Tummel stations without addition to the plant installed or under construction. Last spring they started upon the installation of the third and last turbo-generator at Rannoch, together with a third pipe-line. With the installation of this machinery they would complete the equipment of the Rannoch and Tummel stations. Last year they increased the capacity of Loch Luichart hydro-electric station, owned by the Ross-shire Co., by the installation of an additional 1,250-kW set. The Elgin Electricity Supply Order had been acquired from the Elgin Co., and they had owned and operated that undertaking from the commencement of the current year. The development of the Scottish Border area authorised by the Order granted to the Scottish Southern Co. had been commenced. With regard to their propaganda, their publicity and sales department had at its disposal travelling demonstration vans, and their lady demonstrators attended at women's rural institutes and showrooms to give demonstrations in districts not visited by the demonstration vans. In the Grampians area alone their vans had travelled 11,000 miles. In addition 10,000 personal calls were made by their canvassers, mostly in sparsely populated rural areas. Their subsidiary power and lighting companies sold last year over 208 million kWh, being an increase of 60.7 million kWh, as compared with the previous year. Of the total 106 million kWh was sold to the Central Electricity Board. The average price received was 1.4d. per kWh, and including bulk supplies, the average was reduced to 0.8d. per kWh. The number of consumers connected at the end of the year was 42,707, an increase of 5,655. The maximum demand rose to 66,600 kW, an increase of 15,400 kW, which included their additional bulk contract of 12,000 kW. A number of new districts were opened up, and they had entered into a contract to provide a substantial supply to the B.B.C. in Burghead. To deal with new developments they provided 197 miles of h.p. lines and 111 miles of l.p. distributors. The total length of lines owned and operated by their subsidiaries was now 2,021 miles. They had also made progress during the year with public lighting, having entered into nineteen additional agreements with public authorities.

The British Thomson-Houston Co., Ltd., held its annual meeting on March 28th, when Mr. W. C. Lusk (chairman) said that at the last annual meeting he reported that the orders received during the first three months of 1934 exceeded those for the corresponding period of 1933. The improvement was maintained throughout the year, and orders received and shipments made from their factories exceeded those for the previous year, while unexecuted orders on hand at the end of the year were substantially greater than at the end of 1933. There was an increase of 15 per cent. in the number of employés as compared with a year ago. There was also an improvement in their general business in smaller apparatus and appliances for use in the industrial and domestic fields, the appliances being marketed through their subsidiary and associated selling companies. They were able to resume work during the year on the generating plant for the *Queen Mary*, for the whole of which they received the order in 1931. They were supplying certain portions of the electrical control equipment for the *Scharnhorst* of the North German Lloyd Line. Overseas, South Africa had been the most active market, and with the co-operation of their representatives there, Messrs. Wilson & Herd, they had been successful in securing a good share of the orders which had been placed for electrical plant, including two of the largest Ward Leonard winder equipments in the world for the Grootvlei Proprietary Mines, Ltd. Extensions were carried out during the year at the Coventry works, where they manufactured aero engine magnetos and other aircraft equipment. The popularity of their "Mazda" lamps continued, and they were able to record again an increase in their use. There was also an increase in the use of "Mazda Mercra" electric discharge lamps for street lighting and for floodlighting. The "Mercra" lamp had now been developed for horizontal burning with magnetic control, and an electric discharge sodium lamp, the "Mazda Sodra" had also been put on the market. Progress had continued in research and development in connection with all of their products and also in new fields. It was to be hoped that the efforts to improve price levels in the industry would be more successful in the future, as they were still too low generally, and in the overseas markets were usually unremunerative. They were able to restore on October 1st the reductions in the pay of the members of the staff which were put into effect three years earlier. The prospects for 1935 were not unfavourable; the orders received during the first three months of the year exceeded those received in the corresponding period of 1934.

The Shropshire, Worcestershire & Staffordshire Electric Power Co. held its annual meeting on March 28th, Sir Holberry Mensforth (chairman) presiding. In presenting the report and accounts (Electrical Review, March 15th, page 401) the chairman said that in June last they issued to ordinary shareholders, *pro rata* to their holdings, 325,000 "B" ordinary shares. Since the close of the year a further 500,000 "B" ordinary shares had been issued. The Stourport station, which was now operated under the direction of the Central Electricity Board, was being enlarged by the installation of the equivalent of 50,000 kW of boiler plant, and this, when completed, would enable the station to be used to its full capacity. To meet the growing demand they had continued their policy of extending the transmission and distribution system, and the network now amounted to approximately 1,980 route miles. During the year they had given supplies of electricity to over forty additional villages. The number of consumers connected to the system had increased in the past year by 15 per cent., while the amount of energy supplied for all purposes by the company and its subsidiaries (excluding the South Wales Electric Power Co.), had increased by about 21 per cent. over 1933. While they had obtained their share of the increased demand for power resulting from improved trade conditions, the increase in the sales of electricity was largely due to the greater demand from domestic consumers. Since the close of the year arrangements had been concluded for the renewal of an agreement for the supply of electricity in bulk to the Cheltenham Corporation for a further period. Negotiations for the acquisition of the electricity undertaking at Brecon were almost concluded. Their largest subsidiary, the South Wales Electric Power Co., had made progress during the past year despite the difficulties which had been and were being experienced in the iron and steel and tin-plate trades. The improved results of that company were reflected in the accounts, which included for the first time a dividend on its ordinary stock. The chairman concluded his speech by referring to the election of Mr. R. P. Sloan to the board, the resignation of Mr. J. T. H. Legge from the managing directorship and his appointment as district manager for the S.W. England and S. Wales area of the Central Electricity Board, and the appointment of Mr. E. Morgan as managing director of the company.

The International Automatic Telephone Co., Ltd., held its annual meeting on March 29th. Sir Alexander Roger (chairman), who presided, in the course of his speech said the Automatic Electric Co., whose main manufacture was that of telephone equipment of all kinds, had a satisfactory output, particularly in the latter half of the year and had made progressive recovery of the ground lost in 1933. The order books and prospects of both companies for 1935 were satisfactory. Sales of the Automatic Electric Co.'s sidelines—"Xcel" appliances, vehicle-actuated street signals, fire-alarm systems, signals for mines and other purposes—were expanded. The passing of an Act legalising the totalisator on greyhound tracks reopened the prospect of new business. As an indication of what the future might produce in the way of telephone expansion, in this country, in 1914 there were 782,000 telephone subscribers, while at the end of 1934 these had increased to 2,340,000. They hoped that the policy of extending automatic working to the smallest rural exchanges would be accompanied by an extension of the trunk service in every direction. The industry was playing its part in the general expansion with reduced equipment prices. In spite of the difficulties of the export market, they increased the number of countries to which they exported from forty-three to forty-nine. Part of this business was definitely unremunerative. In Poland last June the telephone installation of Katowice was officially opened. Their contract with the Lithuanian Ministry of Communications was proceeding and erection work on the exchanges had commenced. In Portugal an exchange at Lisbon, to the order of the Anglo-Portguguese Telephone Co., Ltd., was opened in October last. The British Dominions remained an important market. During the year the company acquired the whole of the new class "A" ordinary shares of the Telephone & General Trust, Ltd. The chairman concluded his speech by referring to world developments in communications.

Ericsson Telephones, Ltd.—Presiding at the annual meeting held on March 27th, Col. Sir Harold A. Wernher (chairman) said that satisfactory progress had been made in practically all departments of the business. They had interested themselves during the past year in the manufacture of time recorders of an improved type, and had also introduced a machine recording system, installations of which had already been carried out at the works of some of the leading industrial concerns in Great Britain. In addition to manufacturing telephonic apparatus of all descriptions they had an extensive cabinet department and a modern unit producing cellulose and synthetic enamels and finishes, both for wood and metal-work; sales in both these departments showed a satisfactory expansion. Good progress was also made during the year by the department which supplied telephone systems on rental terms. They had just concluded the manufacture and installation of the largest initially equipped automatic telephone exchange in this country—Central (London). Their total output for 1934 was considerably greater than that of the previous year. There was a substantial increase in the demand from overseas and also from general customers in this country, the total volume of these sales being 57 per cent. higher than in 1933. A lower price basis was ruling in most of the Post Office contracts, but although their total invoiced sales to this department were 13 per cent. lower than in the previous year, the effect of this was more than compensated for by the increase in other sales. They had now in production a number of contracts for totalisators for this country and abroad. The outlook for the future was promising; the company's order book was much bigger than at this time last year, and they had considerably increased the number of workpeople at the factory.

The Newcastle and District Electric Lighting Co., Ltd., held its annual meeting on March 26th, when Col. Sir Frank R. Simpson, Bt., who presided, said that there had been connected

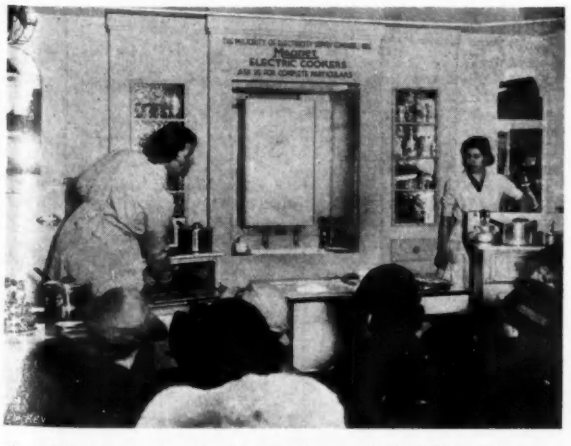
to the mains during the year 3,300 new consumers, which constituted a record for any one year. The sales of electricity showed an increase of 9 per cent. The consumption for shop lighting showed a substantial increase, and there was also an increase in the demand for power purposes. They were now reaping the benefit from the capital expended during the last few years in laying mains over a great part of their area and thereby keeping in direct touch with the builders on the large number of housing estates which had been developed.

The Anglo-Portuguese Telephone Co., Ltd.—Presiding at the annual meeting, held on April 2nd, Sir Alexander Roger (chairman) said that in a year of considerable activity a new exchange with a capacity of 1,000 subscribers' lines was opened at Estoril, a suburb of Lisbon, and several smaller exchanges were opened in other districts, but the outstanding event was the conversion of their North Exchange from manual to automatic working on October 20th last. The new equipment was of Strowger design, and the conversion placed over 92 per cent. of subscribers in Lisbon on automatic working. During the year 2,927 telephones were added to the system, representing an increase of 8.2 per cent. At December 31st, 1926, stations numbered 19,450, while at the end of 1934 they numbered 38,633. During the same period they had expended approximately £1,250,000 in extending and perfecting the service. The Government had recently introduced a project for the development of the resources of the country which would involve an expenditure of £60,000,000 over the next fifteen years. With this in mind the company had recently compiled a five-year plan for the period ending 1940 and it appeared possible that demand for development would require the expenditure of approximately £850,000, an average of £170,000 per annum, although this would not necessarily involve that amount of fresh capital.

The Richmond (Surrey) Electric Light & Power Co., Ltd.—Presiding at the annual meeting on April 2nd Sir Robert Renwick, Bt. (chairman), in the course of his speech said that the sales of electricity amounted to 8,107,340 kWh, as compared with 6,242,661 kWh for the previous year, an increase of nearly 30 per cent., a growth in one year which was without precedent in an area where supply had been available for so many years, and was mainly residential in character. This increase was due mainly to the introduction of facilities for the hire and hire-purchase of various domestic apparatus. As compared with the large increase in sales, receipts only increased by £4,900, or 7 per cent. During the last few years there had been a great deal of criticism in the Press and elsewhere regarding the prices charged to consumers by electricity supply undertakers. In spite of these criticisms, the use of electricity for domestic purposes was progressing at a greater rate to-day in London than in any other capital, and the average price paid by the consumer was lower than in Paris or New York. In Richmond old houses were being converted into flats or pulled down to make room for large modern blocks of flats, a development which could not but improve the prospects of their company.

The Bournemouth & Poole Electricity Supply Co., Ltd., held its annual meeting on April 2nd. Sir Bernard Greenwell, Bt. (chairman), who presided, said that the kWh sold during the year amounted to 33,739,100, as compared with 29,123,385 in the preceding year, an increase of 16 per cent. During the year they laid twenty-three miles of h.p. lines, thirty-two miles of l.p. lines, and fifty-two miles of service lines. Rapid progress had also been made with the change-over of the frequency of supply and they hoped to complete it by the middle of the current year. There had been a large increase in the number of kWh sold under the two-part tariffs and now over 61 per cent. of their ordinary consumers were charged on this basis. An impetus had been given to this side of the business by the reduction during the year of the standing charge under the business two-part tariffs in their central area. In the areas under the Wimborne Orders they had made reductions in the running charge under the domestic two-part tariff, and in these areas alone for one year there had been an increase of nearly 43 per cent. in the sale of electricity, and of over 50 per cent. in the number of consumers. They had acquired the Swanage undertaking and that of the Milton and Barton-on-Sea Co.

The South London Electric Supply Corporation, Ltd., held its annual meeting on April 2nd, when Lord Gainford (chairman), who presided, said that the sales of electricity during the year amounted to 5,886,735 kWh, an increase of 16 per cent. The results for the year were excellent, particularly as their area was, in the main, an industrial one and coupled with the fact that they had made reductions under the two-part tariffs. Apart, however, from the increase in output for power purposes, there had been a decided improvement in the consumption on the domestic side, particularly as regarded cooking and water heating. Within a few weeks there was to be a radical change in the lighting of the Thames Embankment which bordered their area—from Westminster Bridge to Vauxhall Bridge. Both for the parapet lighting on the Embankment itself and the main road lighting along the Embankment they had obtained contracts for installing electric discharge lamps, and every effort was being made to complete the installation in time for the Jubilee celebrations.



A cooking demonstration in progress on the G.E.C. stand at the Ideal Home Exhibition

A. Reyrolle & Co., Ltd., report a profit for 1934 of £103,303, as compared with £98,644 in the preceding year, to which is added £113,855 brought in, and after deducting £1,000 for distribution to local charities, there is a total of £216,158 available. A sum of £20,000 is set aside for provision for development expenditure, and it is proposed to maintain the ordinary dividend at 12½ per cent., leaving £115,858 to be carried forward. The report refers to the formation of the Parolle Electrical Plant Co., Ltd., towards which the company subscribed 260,000 shares of £1 each and advanced a loan of £53,500. The aggregate value of orders received and sales during the year, including those of J. H. Holmes & Co., was greater than in the previous year. There was a reduction in the value of uncompleted work in hand at the end of the year. Meeting: April 4th.

The British Aluminium Co., Ltd., held its annual meeting on March 29th, when Mr. R. W. Cooper (chairman), in the course of his speech said that during the year the second stage of the hydro-electric works at Lochaber was completed by their subsidiary company, the North British Aluminium Co., Ltd., and was now available to augment the production of aluminium by that company. A sum of approximately £5,000,000 had been expended on the Lochaber undertaking. The aluminium works had fully come up to their expectations and had operated satisfactorily during the year, the North British Aluminium Co., Ltd., having covered all charges with a small residual profit in addition.

The Windermere & District Electricity Supply Co.—A provisional agreement has been entered into between British and Allied Investments Corporation, acting on behalf of British & International Utilities, for the cash purchase of the shares of the Windermere Co. According to the *Financial Times*, the deal involves a sum of £108,400, and for each £5 ordinary share of the Windermere Co., the Corporation offers £10; for each £5 6 per cent. cumulative preference share £7; and for each £5 7½ per cent. non-comulative preference share £7 10s. per share. The directors of the Windermere Co. recommend acceptance of the offer.

The Marconi International Marine Communication Co., Ltd., reports a profit of £120,891 for 1934, as compared with £104,222 in the preceding year. To this is added £11,813 brought in, making £132,704. Income tax reserve receives £5,000 and general reserve £25,000, and it is proposed to pay a final dividend of 5 per cent., making 7½ per cent. for the year, leaving £13,250 to be carried forward. Meeting: April 12th.

Stocks and Shares

Tuesday Evening.

STOCK Exchange markets, prices and business are harassed by the kaleidoscopic changes which occur almost every week in the matter of foreign exchanges and currency. Devaluation of the belga and the political crises which arose at the end of last week have thrown afresh into the melting pot the problem as to how long France, Switzerland, Holland and other gold bloc countries can remain on the gold standard. The Belgian devaluation had the effect of putting down prices of shares in iron, steel and kindred companies working in this country, but as the latter have the advantage of the recent increase in the tariff, the declines do not amount to much. There is no particular recovery in gilt-edged securities, these for the time being hanging upon the Budget prospects to be resolved on Monday, April 15th. Agreement is said to have been reached by the Copper Conference in New York on some of the principal points submitted to its consideration, and, as a result, prices of copper shares stand a trifle higher than they did a week ago.

Gilt-edged Stocks

Central Electricity stocks hold their prices very firmly. Movements in London Passenger Transport issues are confined to a fall of ¼ in the 5 per cent. "B" stock. West Midlands J.E.A. fives are a point down at 115. Of the last-offered Central Electricity 3¼ per cent. issue, £10,000 is available at 97¼ free of stamp, paying £3 7s. 6d. per cent. as a running yield and £3 8s. per cent. assuming redemption at 100 in the later of the two years, 1974-1994, attached to the loan. A better yield is obtainable from the Board's 5 per cent. stock, March and September interest, dated 1950-1970. Of this, there is £5,000 on offer at 115¼, the flat yield being £4 6s. per cent. on the money, and redemption yield, taking 1950 as the probable date of repayment, £3 12s. 6d. per cent. By comparison with the returns obtainable from similar stocks in the trustee group, the return on the last-named stock is worth noticing. Notwithstanding the fall that has occurred in most of the gilt-edged securities, it is still a matter of considerable difficulty to obtain 4 per cent. on the money from front-rank stocks.

Home Electricity Supply Shares

Some little recovery has occurred in the ordinary shares of the London electricity supply companies. This reaction is only natural, the recent fall having been sufficiently heavy to direct attention to the temptation offered by the shares at the prices

to which they have given way. Moreover, the articles of association of the London Associated Electricity Undertakings, Ltd., have been altered in such a manner as to ensure the support of some of the largest interests which previously had objected to certain of the clauses. The alteration makes it impossible for the new company to sell any of its shares in its subsidiaries, nor may it borrow monies except for the purpose of financing business of the subsidiary companies. These changes have satisfied the objections raised by powerful interests, which now, in view of the alterations, counsel acceptance of the scheme for exchanging shares in the six London companies for shares in the London Associated Electricity Undertakings, Ltd. The ordinary shares of the Brompton & Kensington, the Charing Cross and Chelsea, are all better on the week. In the provincial group, North-Eastern preference have weakened slightly; Midland Counties are 6d. better.

The " Three Counties " Company

The annual meeting of the Shropshire, Worcestershire & Staffordshire Electric Power evoked an interesting speech from the chairman, in which he stated that the company had extended supplies to more than forty additional villages during the past year. The South Wales subsidiary, the largest in the group, appears for the first time in the parent company's accounts as a dividend payer. Opposition is offered to the proposal of the Oxford Electric Company that the company's 6 per cent. preference shares should be repaid at 22s. 6d. The Oxford Electric Company is one of the Edmundson's group, controlled by the Greater London & Counties Trust. The scheme now before the shareholders suggests repayment of the preference, a return of half the nominal capital on each £1 ordinary share, and other rearrangements of the capital account.

Miscellaneous Matters

British Power and Light ordinary at 23s. 9d. are the pence better on the week. Palestine ordinary lost 3d., going back to half a guinea premium. West Gloucestershire ordinary are 1 higher at 86. Five thousand Lancashire ordinary are offered at 35s. 9d., giving a yield at that price of 4$\frac{7}{8}$ per cent. on the basis of the 7½ per cent. dividend now being paid. Victoria Falls Power ordinary are a good market, a rise of $\frac{3}{16}$ lifting the price to 7$\frac{5}{16}$. But the main movement shown in this week's price-lists is a rise of 60 points in the deferred stock of the British Electric Traction Co.

Cables and Wireless

Prices of the stocks in the Cable & Wireless combine show no changes on the week. The market is still somewhat heavy, the preference stock at 82 being, however, a centre of interest by reason of the expectations formed in regard to the forthcoming dividend announcement. Optimism looks for 4 per cent. for the year; the more cautious estimate says 3½ per cent. Eleven months ago the dividend was 2¾ per cent., at which latter rate the yield on the money, at the present price, comes to £3 7s. per cent. If the combine were able to distribute 4 per cent. on the preference stock, this would give a return, at the current figure, of nearly 5 per cent. on the money, allowing for the inclusion of the dividend in the price. The monthly index of traffics has been somewhat disappointing. A year ago it was generally hoped that Cable & Wireless would be able to show at least 5½ per cent. on the preference stock in the accounts for this present period, and the Micawber-like waiting for something more progressive to turn up has proved, there can be no doubt, a real trial to the patience of the shareholders. The other issues in the telegraph and telephone market hold their ground, with the exception of Marconi Marines, where the price is $\frac{1}{16}$ lower. The annual report, showing profits of £120,900, an increase of 15 per cent. on the previous year, is hardly up to expectations, and the maintenance of the dividend at 7½ per cent. led to a few shares being sold by people who had thought that the company would be able to repeat the dividend of 10 per cent. paid for 1932. Great Northern Telegraphs at 38 are £1 down. The Anglo-American group is quiet. American Telephone & Telegraph at 107 shows no alteration. International Telephone & Telegraphs remain at 6¾.

Manufacturing and Equipment

Johnson & Phillips have been a good market, with a rise of 3s. on expectations of an increase in the dividend. In each of the last two preceding years 5 per cent. was paid. Prophets talk of a possible 6½ per cent., if not more, for the year recently ended. Dividend hopes are also rife in regard to Siemens ordinary, upon which last year 4 per cent. was paid, as against 6½ in the preceding year. The market for manufacturing and equipment shares is steady, Enfield Cables shares being something of an exception. The price fell to 92s. before it recovered to 93s. 9d., showing a loss of 3s. 9d. on the week. The iron and steel market is dullish. Uncertainty prevails as to what is likely to be the upshot of Belgium devaluing her currency. In some quarters it is thought that this may intensify competition, though in other directions such an apprehension is considered superfluous. The rubber share market is heavy, owing to the want of resilience in the price of the raw material. After a brief spurt to over 6d. per lb. the price reacted to 5¾d. Speculative investment markets round the Stock Exchange are disturbed by sporadic outbursts of liquidation, the effects of which reach into most departments of the House.

Share List of Electrical Companies

HOME ELECTRICITY COMPANIES.

	Nom.	Dividend 1934.	Dividend 1935.	Price. Apl. 2	Rise or Fall.	Yield. p.c. £ s. d.
Bournemouth and Poole	1	15	15	76/3xd	—	3 18 9
Brompton Ordinary	1	7	7	33/6	+6d.	4 3 7
Charing Cross Ordinary	1	7	7	33/9	+9d.	4 3 0
Chelsea	1	7	7	33/6	+6d.	4 3 7
City of London	1	7½	7½	36/6	—	4 2 2
Clyde Valley	1	7	8	41/–	–6d.	3 18 2
County of London	1	10½	10½	54/–	—	3 17 9
Edmundson's 7% Pref.	1	7	7	35/–	—	4 0 0
Elec. Dis. Yorkshire	1	9	9	46/–	—	3 18 3
Elec. Supply Corporation	1	11	—	56/3	—	3 18 5
Kensington Ordinary	1	7	7	33/6	—	4 3 7
Lancs Light and Power	1	7½	7½	36/–	—	4 3 4
London Electric	1	7	8	37/6	–6d.	3 11 8
Metropolitan	1	10	10	50/–	+6d.	4 0 0
Midland Counties	1	7	7	35/6	+6d.	3 19 0
Mid. Elec. Power	1	8	8	51/3	—	3 2 6
North Eastern Electric Ordinary	1	6	6	30/6	—	3 18 8
Do. 7% Pref.	1	7	7	34/–	–6d.	4 2 4
Northampton	1	10	10	52/6	—	3 16 4
Notting Hill 6% Pref.	10	6	6	14	—	4 5 9
North Met. Elec. Ordinary	1	10	10	58/3	—	3 8 9
Do. do. 6% Pref.	1	6	6	31/–	—	3 17 5
St. James and Pall Mall	1	7	8½	33/6	—	4 18 6
Scottish Power	1	8	8	40/–	–2/–	4 0 0
South London	1	7	7	35/6	—	3 17 9
Westminster Ordinary	1	7	7	33/6	—	4 3 7
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	26/3	—	5 14 1
Yorkshire Elec.	1	8	8	42/6	—	3 15 5

PUBLIC BOARDS.

Central Electricity, 1950–70	Stock	5	5	115	—	4 7 2
Do. 1955–75	„	5	5	117	—	4 5 6
Do. 1951–73	„	4½	4½	111	—	4 1 1
Do. 1963–93	„	—	3½	101	—	3 9 6
London & Home Counties, 1955–75	„	4½	4½	114	—	3 19 0
London Passenger Transport, A	„	—	4½	121½	—	3 14 0
Do. do. B	„	—	5	124	–½	4 0 8
Do. do. C	„	3	—	97	—	3 1 10
West Midlands Joint Elec. 1948–68	„	—	5	115	–1	4 7 0

TELEGRAPH AND TELEPHONE.

		1932	1933			
American Tel. & Tel.	$100	9	9	107	—	8 8 2
Anglo-Am. Tel. Pref.	Stock	6	6	117½	—	5 2 2
Do. Def.	„	1½	1½	28	—	5 7 2
Cable & Wireless 5½% Pref.	„	2¾	2¾	82	—	3 7 1
Do. A. 7½% Ord.	„	Nil	Nil	16½	—	—
Do. B. Ord.	„	Nil	Nil	5¾	—	—
Globe Tel. & Tel. Ord.	10	Nil	2½	11½	—	2 3 7
Do. do. Pref.	10	6	6	13½	—	4 10 7
Great Northern Tel.	10	20	20	38	–1	5 5 3
Marconi-Marine	1	10	7½	31/3	–⅛	4 16 0
Oriental Telephone Ord.	1	12	12	3⅛	—	*3 12 5

HOME AND FOREIGN TRAMS, ETC.

Anglo-Arg. Trams First Pref.	5	Nil	Nil	2/–	—	—
Do. do. 2nd Pref.	5	Nil	Nil	1/6	—	—
Do. do. 5% Deb.	Stock	Nil	Nil	5	—	—
British Electric Traction Df. Ord.	„	5	5	945	+60	—
Do. do. Pref. Ord.	„	8	8	165	–½	4 17 0
Brazil Traction	100	—	—	9	–½	—
Brit. Columbia Elec. Rly. Pce.	Stock	5	5	102½	—	4 17 6
Mexican Light Common	100	Nil	Nil	1½	—	—
Do. 7% Pref.	100	7	7	4½	—	—
Do. 1st Bonds	$500	5	5	39½	–½	—
Victoria Falls Ord.	1	15	20	7⅞	+⅛	2 14 9
Yorkshire (West Riding)	1	2½	5	28/9	—	3 9 9

MANUFACTURING COMPANIES.

Aron Electricity Ord.	1	10	10	63/9	—	3 3 0
Assoc. Elec. Ord.	1	4	6	24/6	—	4 18 0
Do. Prf.	1	8	8	37/–	—	4 6 4
Babcock & Wilcox	1	9	6	44/3	+6d.	2 14 6
British Aluminium Ord.	1	5	7½	30/3	–3d.	4 19 2
British Insulated Ord.	1	5	15	75/–	—	4 0 0
Brush Ord.	Stock	Nil	Nil	37½	—	—
Callender's	1	15	15	3½	—	4 5 9
Do. 6½% Pref.	1	6½	6½	32/6	—	4 0 0
Crompton Parkinson Ord.	5/–	22	12½	35/6	—	1 15 0
Do. 8% Pref.	1	8	8	36/3	—	4 8 5
Edison Swan 1st Pref.	1	7½	7½	27/6	—	5 9 1
Electric Construction	1	Nil	Nil	15/–	—	—
Enfield Cable Ord.	1	25	20	4¼	–⅛	5 6 7
English Electric	1	Nil	Nil	6/9	—	—
Do. do. Pref.	1	Nil	Nil	13/3	+9d.	—
Ever Ready	5/–	35	35	22/9	—	7 13 10
Ferranti Pref.	1	7	7	29/–	–6d.	4 16 7
G.E.C. Pref.	1	6½	6½	30/–	—	4 6 8
Do. Ord.	1	8	8	48/3	—	3 6 7
Henley's	1	30	30	6¾	–⅛	4 9 0
Do. 4½% Pref.	5	4½	4½	5⅞	—	3 16 8
India-Rubber Preferred	1	—	5½	1¼	—	4 17 9
Johnson & Phillips	1	5	5	31/3	+3/–	3 4 0
Siemens Ord.	1	6½	4	1	—	4 0 0
Telegraph Construction	£1	Nil	Nil	1⅛	–⅛	—

* Dividends paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged and all subsequent proceedings will be taken.

1933

16452. "Load and/or power factor control in electric-power supply systems." General Electric Co., Ltd., and J. W. Gibson. June 8th, 1933. (425161.)

17580. "Electric discharge tubes." Naamlooze Vennoot schap Philips' Gloeilampenfabrieken. June 30th, 1932. (425103.)

18411. "Rectifying systems." International General Electric Co., Inc. June 28th, 1932. (425033.)

21351. "Apparatus for producing electrical oscillations of saw-tooth and like wave form." Electric & Musical Industries, Ltd., and G. E. Condliffe. August 3rd, 1933. (425035.)

21908. "Metal-clad electric switchgear." A. Reyrolle & Co., Ltd., A. Allan and J. Small. August 4th, 1933. (Cognate application 27034/33.) (425107.)

22022. "Television or like apparatus." A. G. D. West and Baird Television, Ltd. August 4th, 1933. (424961.)

22082. "Electric discharge tubes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. September 26th, 1932. (Addition to 392796.) (425219.)

22191. "Television and the like transmission systems." W. S. Percival, C. O. Browne, E. L. C. White and Electric & Musical Industries, Ltd. August 8th, 1933. (425220.)

23415. "Electric motors." I. M. Evans. August 23rd, 1933. (424963.)

23763. "Radio-receiving systems." E. J. Pound and McMichael Radio, Ltd. August 26th, 1933. (424965.)

23973. "Electric transformers." British Thomson-Houston Co., Ltd., R. I. Martin and J. G. Wellings. August 29th, 1933. (424968.)

24451. "Electric cable installations." Okonite-Callender Cable Co., Inc. September 2nd, 1932. (425113.)

24483. "Electrical resistances." Expanded Metal Co., Ltd., H. Booton and R. A. Clay. September 4th, 1933. (425043.)

24593. "Automatically operated electric switching and other safety devices for use upon a vehicle or craft." H. M. Salmond. September 5th, 1933. (425117.)

24698. "Joints for electric cables." Okonite-Callender Cable Co., Inc. September 12th. 1932. (425121.)

24699. "Terminals for electric cables." Okonite-Callender Cable Co., Inc. September 12th, 1932. (425122.)

24721. "Process for producing a white luminous effect in tubes of electrified neon gas." R. de Lamprecht. September 6th, 1933. (425053.)

24839. "Holder for electrodes for use in electric arc welding." W. Charles. September 7th, 1933. (Cognate application 29918/33.) (425225.)

24943. "Expansion chambers for hermetically sealed tanks or casings, applicable to the cooling tanks of electrical apparatus." J. L. Thompson. September 8th, 1933. (425169.)

25135/6. "Electric boiling or hot plates." Falk, Stadelmann & Co., Ltd., and S. F. Bickell. September 11th, 1933. (425231/2.)

25158. "Cathode-ray tubes." Electric & Musical Industries, Ltd., and W. F. Tedham. September 11th, 1933. (425234.)

25159. "Signalling systems, such, for example, as television systems." Electric & Musical Industries, Ltd., C. O. Browne and J. Hardwick. September 11th, 1933. (425177.)

25169. "Electric batteries." L. Ventrella. September 12th. 1932. (425236.)

25387. "Electric motors." British Thomson-Houston Co., Ltd. September 13th, 1932. (424980.)

25471. "Electrical cooking appliances." G. A. Mower. September 14th, 1933. (424981.)

30500. "Galvanic cells." National Carbon Co., Inc. November 10th, 1932. (425247.)

32326. "Electric heating resistance elements." General Electric Co., Ltd., and O. W. Humphreys. November 20th, 1933. (425249.)

32764. "Electric heating apparatus." General Electric Co., Ltd., O. W. Humphreys and C. W. Stopford. November 23rd, 1933. (424987.)

32921. "Telephones." A. Graham & Co., Ltd., and C. H. Vaughan. November 24th, 1933. (425186.)

35931. "Electric switches having arc-rupturing means." Etablissements Merlin & Gerin. February 28th, 1933. (Cognate application 35932/33.) (424990.)

1934

2881. "Installations comprising three-phase electric motors supplied through electrical discharge vessels." Siemens-Schuckertwerke Akt.-Ges. January 28th, 1933. (425071.)

3323. "Electric hot-plates and the like." Revo Electric Co., Ltd., and F. H. Reeves. February 1st, 1934. (425255.)

3366. "Recording and reproduction of electrical impulses." Radio Corporation of America." February 1st, 1933. (425256.)

5215. "Electric heaters, radiators and fires." W. M. Betts. February 16th, 1934. (425258.)

5602. "Controlling the speed of electric motors, particularly lift-driving motors." E. N. Hammond. February 20th, 1934. (424994.)

6511. "Electrical circuit arrangements for producing multiple-phase alternating potentials of adjustable phase position." Siemens-Schuckertwerke Akt.-Ges. February 28th, 1933. (425195.)

7442. "Collecting system of electric current for electric cars." S. Saito, N. Yamamoto and M. Megishi. March 8th, 1934. (425143.)

11324. "Electromagnetic brakes." E. M. Fraser. April 14th, 1934. (425074.)

14671. "Automatic alarm arrangements." Marconi's Wireless Telegraph Co., Ltd. May 25th, 1933. (424996.)

17232. "Cathode-ray tubes." Fernseh Akt.-Ges. June 10th, 1933. (425267.)

20185. "Synchronous motor for television or like systems." H. A. Richardson. October 5th, 1934. (425205.)

24919. "Electric batteries." L. Ventrella. September 11th, 1933. (Divided out of 25169/33.) (425277.)

25589. "Glasses for the stems and flares of electric lamps." Corning Glass Works. October 23rd, 1933. (425007.)

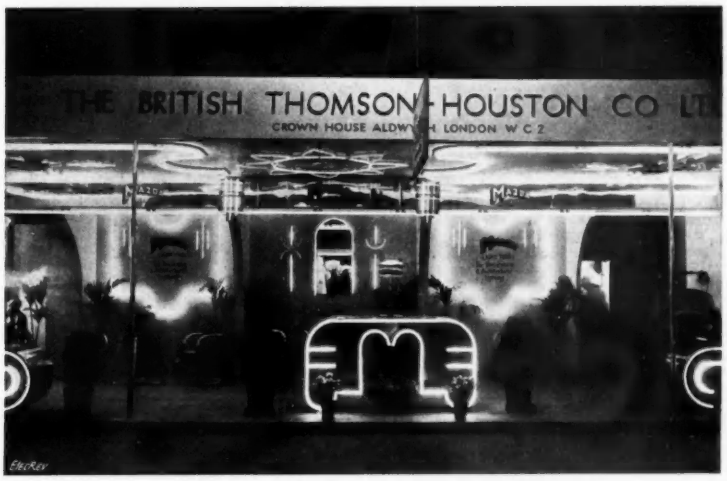
26324. "Apparatus for electric-arc welding." British Thomson-Houston Co., Ltd. September 19th, 1933. (425155.)

26627. "Electrical systems for indicating, recording and/or integrating the values of physical quantities." A. G. S. Sandison. September 17th, 1934. (425094.)

30099. "Wireless receiving systems of the superheterodyne type." L. A. Peyton. February 22nd, 1933. (Divided out of 2944/34.) (425021.)

31084. "Electric motor controllers." Donovan Electrical Co., Ltd., and E. T. G. Donovan. October 30th, 1934. (425285.)

33940. "Electric converting apparatus." British Thomson-Houston Co., Ltd. November 25th, 1933. (425025.)



The B.T.H. stand at the Ideal Home Exhibition

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from March 27th:—

Amphidyne. No. 557538. All goods in Class 6.—Metropolitan-Vickers Electrical Co., Ltd., Bush House, Aldwych, W.C.2.

TP (lettering and design). No. 555610. All goods in Class 8. —Truwind Products, Ltd., Idris Yard, Pratt Street, N.W.1.

Bimac. No. 557722. Class 8. Electric cables and flexibles.—British Insulated Cables, Ltd., Prescot, Lancs.

Catalin. No. 556986. Class 50. Synthetic resin in the form of plastic compositions, moulding powders, sheets and tubes, and cast and moulded articles made of synthetic resin.—The Catalin Corporation of America, Fords, N.J. (British representatives: Marks & Clerk, 57-58, Lincoln's Inn, W.C.2.)

Fiberoid. No. 557050. Class 50. Cellulose acetate and cellulose nitrate material, all in the form of rods, tubes, sheets and moulding powders, and articles made therefrom.—Fiberoid Corporation, Indian Orchard, Mass. (British representatives: Marks & Clerk, 57-58, Lincoln's Inn Fields, W.C.2.)

Zofeloid. No. 557414; also Domolac. No. 557415. Class 50. Electrical insulating material, &c., all being composed principally of cellulose or of cellulose derivatives, and sold in liquid, semi-liquid or solid form.—British Domolac Co., Ltd., 81, Harrow Manorway, Abbey Wood, S.E.2.

An Irish Electrical Association

A general meeting of the Society of Irish Electrical Traders was held recently at Jury's Hotel, Dublin. The Society was established about four months ago, and the general meeting was convened by the Council with a view to informing members of the progress made. The Society, which has made encouraging headway during its first few months of operation, is recruited from the wholesale and retail electrical trades in the Irish Free State. Members present at the meeting were representative of Dublin city and county, and the provinces. Mr. W. A. Mombrum (General Electric Co., Ltd., Dublin), president, was in the chair. A report drawn up by the president and secretary was unanimously approved. Other speakers were: Messrs. A. G. Bruty (vice-president), Mulligan, Cummins, Jun., Garner (Cork), P. Abels, T. J. Litton, J. A. McConnell, A. K. Jackson, L. C. Wainwright, Ryan (Killarney); and Senator P. Fitzgerald.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Barnstaple.—Houses (20); borough surveyor.

Beckenham.—Schools, Braemar Gardens, West Wickham, for the R.C. managers; Rev. Father Byrne.

Belper.—Cinema, for the Public Hall Co. (electrical work); J. W. Haynes, builder.

Bilston.—Houses (300), Millfields Road; A. F. B. Sidwick, surveyor.

Birmingham.—Houses (1,500), development of Elmdon Aerodrome (£47,500), and reconstruction of Monument Road Baths (£32,000); city engineer.

Blyth (Northumberland).—Houses (250) for the Cowpen Coal Co., Malvins Close; W. Dixon and Sons, architects, 1, Collingwood Street, Newcastle-on-Tyne.

Bolton.—Houses, Primrose Hill Estate, Hilton Lane, Little Hulton; Palatine Builders and Estates, Ltd., 17, Mawdesley Street. Houses (48), Corrin Road; M. Edwardes. Houses (39), Doffcocker Hall Estate; Arnold England. Houses (34), Trowden Avenue; J. Massey & Sons.

Bradford (Yorkshire).—Houses and shops, Moor Avenue; J. A. Groves & Sons, builders, 10, Beechwood Avenue, Wibsey.

Brecknockshire.—Extensions to Secondary schools (£38,000), for County E.C.; director of education, Brecon.

Bridgwater (Somerset).—Factory (£250,000), for Courtaulds, Ltd.

Brighton.—Public hall, Rottingdean; borough engineer.

Brownhills.—Houses, Walsall Wood, Shelfield and Brownhills; U.D.C. surveyor.

Bucknall (Staffordshire).—Houses (78), Birchgate; J. Withington.

Bury St. Edmunds.—Houses (216), near Westley Road, for Frank Benham (electrical work).

Cheltenham.—Houses (24), Naunton Way; Cheltenham Estates, Ltd. Factory, St. George's Road; L. W. Barnard.

Chippenham.—Houses (140), Park Farm Estate, for Taylor-Woodrow Estates, Ltd.

Dorking.—Houses (34), Westcott; U.D.C. surveyor.

Dudley.—Houses (35), Birmingham New Road; W. Whittingham. Extensions to Bean Road School; Blue Coat trustees.

Dumfries.—Houses (116) (£36,000); Mr. Osborne, master of works.

Durham.—School, Burnhope, for County E.C.; J. J. Hodgson & Sons, Ltd., builders, Ewell, Surrey.

Eastbourne.—Alterations to Hydro Hotel, Mount Road; G. Bainbridge & Son, Ltd. Additions to Princess Alice Hospital, Carew Road; T. A. Pole. Alterations to South Cliff Hotel, South Cliff; F. C. Benz, architect. Alterations and additions to Queenborough Hotel, Grand Parade; T. F. Sayer.

Edinburgh.—Houses (80), Brunstane Road; T. Sutherland Henderson, builder, 20, Melville Street.

Enfield.—Houses (40), Ladysmith Road; W. Marsden & Co. Factory, Great Cambridge Road; Chamberlain & Willows.

Epsom.—Factory, East Street; Vertue, Son & Churcher, solicitors, 19, Hanover Square, London, W.1.

Erith.—School, Belvedere, for E.C.; J. H. Clayton, architect. Council Offices.

Essex.—County High School, Chingford, for County E.C. Junior school, Collier Row, Romford; county architect, Chelmsford.

Felling-on-Tyne.—Houses (30), Rectory Road; H. Fawcett, housing architect (direct labour).

Finchley.—Fire station, Long Lane (£31,089); W. J. Cearns, Ltd.

Flamborough.—Houses (24), Woodcot Road, for J. Conlin; F. Vaux, architect, Quay Road, Bridlington.

Folkestone.—Senior and junior schools, Morehall (£22,000), for Borough E.C.; director of education.

Gateshead-on-Tyne.—Houses (30), Saltmeadows; borough engineer.

Glasgow.—Bakery, Ibrox, for R. A. Peacock & Sons, Ltd. (£50,000); Andrew Wilson, architect, George Street. Hotel, Gallowgate; C. J. McNair, architect, 272, St. Vincent Street.

Gloucester.—Houses (264), Tredworth and Chequers Bridge sites; Housing Committee.

Hadleigh (Essex).—Houses (1,000), Hollywood Estate; J. S. Cooper, 73, Park Lane, Southend-on-Sea.

Hanley.—Houses (172), Leek Road; Ball & Robinson.

Hertfordshire.—School (200 places), Sandon, Buntingford, for County E.C.; director of education, Hertford.

Hetton (Co. Durham).—Houses (32); A. H. Fennell, architect, Bridge End Chambers, Chester-le-Street.

High Wycombe.—Houses (28), Stokenchurch; C. H. Wright, architect, 24, Temple Street, Aylesbury.

Hoole.—Houses (60); U.D.C. surveyor.

Hove.—Installing electric lighting and heating to Upper Portslade Sanatorium; N. E. Chadwick, Public Health Office, Town Hall Annexe.

Huddersfield.—Houses (40), Dalmeny Avenue, Crosland Moor; Lunn & Kaye, architects, Milnsbridge.

Ipswich.—Senior school, Greenwich Estate (£20,225), for E.C.

Jarrow-on-Tyne.—Houses (150); borough engineer.

Kent.—Secondary school, Crittall's corner, Chislehurst, for County E.C.; education architect, Maidstone.

Ketton.—Houses (34), various sites; R.D.C. surveyor.

Kilmarnock.—Houses (100), Knockinlaw, electrical work; James Hay & Steel, architects, West George Street.

Kingston-on-Thames.—Baths (£46,500); V. Bain, architect.

Lancashire.—Council school, Little Hoole, near Longton, for County E.C.; Stephen Wilkinson, county architect, County Offices, Preston.

Leatherhead.—Extensions to Leatherhead School (£30,000), electrical work; Oswald P. Milne, architect, Wigmore Street, London, W.1.

London.—(Bermondsey).—Dwellings (1,147), for slum schemes; works manager. (Hackney).—Reconstruction of Pembury Street area (£250,000); L.C.C. architect. (Islington).—Tenements, Northampton Street (£25,000); Gee, Walker & Slater, Ltd. (Southwark).—Health department offices, Walworth Road (£50,000); borough engineer. (Woolwich).—Dwellings (264) (£126,649), Middle Park Estate, Eltham; borough surveyor. School, Middle Park Estate (£46,000); L.C.C. architect.

Longton (Staffordshire).—Houses (32), Trentham Road; Holloway & Co.

Maidstone.—Flats (72); T. F. Bunting, borough surveyor. Houses (48), for Cooper Estates, Ltd.

Manchester.—Houses (496), Piper Hill and Sharston Mount Estates, Wythenshawe; city surveyor.

Merthyr Tydfil.—Houses, Galon Uchaf (£21,035); D. R. Jones, Abertridwr.

Middlesex.—Extensions to Twickenham Girls' School (£14,718), for County E.C.; director of education, 40, Eccleston Square, London, S.W.

Middlesbrough.—Houses (126), Beechgrove Road, for J. B. McLean; Archbald and Archbald, architects, 26, Albert Road. Houses (172), Marton Road, and extensions to premises, Marton Road, for Donaldsons, Ltd.; Kitching & Co., architects, 21, Albert Road.

Morecambe.—Houses (40), Woodlands Estate; N. L. Proctor.

Newcastle-on-Tyne.—Business premises, Market Street and Trafalgar Street, for the Electrical General Supplies, Ltd.; Watson & Scott, architects, 16, Pilgrim Street. Mineral water factory for J. H. Crawford; J. R. Rutherford & Sons, builders, Jesmond.

Northampton.—Houses (200); borough engineer.

Nottinghamshire.—Relief offices at Mansfield, for C.C.; county architect, Shire Hall, Nottingham.

Okehampton.—Houses (26); borough surveyor.

Old Fletton.—Houses (66), Whittlesey Road, Stanground, for Mr. Shelton, junior.

Oxford.—Houses (67), Iffley Turn Estate; F. A. Sutton. Baths, Hinksey (£40,000), and East Oxford (£20,000); city engineer. Cinema, on the site of Castle Street Bus Station; City of Oxford Motor Services, Ltd.

Portsmouth.—Extensions to Head Post Office and telephone exchange for H.M. Office of Works, King Charles Street, London, S.W.1.

Rickmansworth.—Cinema, High Street, for Odeon (Rickmansworth), Ltd.

Rochester.—Houses (52), Temple Farm Estate; city surveyor.

Romford.—Municipal offices and town hall, Swan Meadow (£35,000); K. M. B. Cross, assessor architect.

Rutherglen.—Cinema, for the Suburban Picture Houses, Ltd., Canniesburn Toll, Bearsden; the secretary.

Sandyford (Staffordshire).—Houses (88), near High Street; J. Smith.

Seaham Harbour.—Houses (100); J. B. Abbey, U.D.C. surveyor.

Sheffield.—Houses (20), near Crimicar Lane; Simpson Bros., Ltd. Houses (28), Retford Road; W. & E. Sadler, Ltd. Houses (44), Warminster Crescent; W. & J. Laver. Chocolate factory, Archer Road; J. W. Blackhurst. Church, Millhouses Lane; Methodist trustees. Extensions to Lodge Moor Hospital by direct labour (£25,000); city architect.

Shipley.—Houses (145), West Royds Estate (£42,600); U.D.C. surveyor. Two schools for E.C.

Smethwick.—Extensions to works, Dartmouth Road; Midland Motor Cylinder Co., Ltd.

Southgate.—Houses (37), Firs Lane; B. Hobbs, architect, 7, Park Lane, London, W.1. Fifty-seven garages, Cranford Gardens; H. Seymour Couchman & Sons.

South Shields.—Presbyterian Church; T. A. Page, Son and Bradbury, architects, 67, King Street. School, Cleadon; J. Reid, borough engineer.

Stanley (Yorkshire).—Houses, Woodhall Estate; W. A. Quibell, U.D.C. surveyor.

Stoke-on-Trent.—Houses (30), Hawthorne Estate, Trent Vale; Birchenwood Brick & Tile Co., Ltd. Houses (27), near Shelton New Road; G. H. Broad.

Surrey.—Technical college, technical and commercial schools and school of art, Stoke Park, Guildford, for County E.C.; secretary, Kingston-on-Thames.

Swindon.—Telephone exchange; H.M. Office of Works, London, S.W.1.

Tottenham.—Baths, Broadwater Farm (£29,932); borough engineer. Factory, Garman Road; Commercial Structures, Ltd. Extensions to factory, The Hale; A. W. Flatau & Co., Ltd. Extensions to works, Fawley Road; D. Gestetner, Ltd.

Tynemouth.—Cinema, Balkwell Estate; E. M. Lawson, architect, 19, Ridley Place, Newcastle-on-Tyne. Premises for the Co-operative Wholesale Society, Hawkeys Lane; W. Stockdale, architect.

Wantage.—Houses (64); J. W. Harris, architect, Willesleigh, East Challow.

West Lothian.—County offices, Linlithgow (£35,000); Mr. Hamilton, superintendent of works, Bathgate.

Wigan.—Grammar school (£35,203), for Borough E.C.; Henry Willcock & Co., builders, Wolverhampton.

Woking.—Houses (50), Burnt Barn Farm; W. C. Slocock, Ltd., builder.

Wood Green.—Houses (150) in the vicinity of Norfolk Avenue; Hilbery Chaplin, Ltd. Houses (56), Woodfield Way; F. F. Tomlin, surveyor, 195, High Road, London, N.22.

York.—Houses (51), Leslie Avenue; S. Newman. Houses and flats, Water Lane; city engineer. Church, Huntingdon Road; J. Watkinson. Reconstruction of works, Bootham Street, Bootham Engineers, Ltd.